



Prepared for:
THE CITY OF MARICOPA
45145 West Madison Ave.
Maricopa, Arizona 85239

and



ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY ENGINEERING GROUP
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Final Feasibility Report/ Environmental Overview

August 2007



PROJECT 347 PN 173 H700701D
SR 347 AT UNION PACIFIC RAILROAD
MARICOPA ROAD
STATE ROUTE 347
TUCSON DISTRICT - PINAL COUNTY

**Final Feasibility Report/Environmental Overview
August 2007**

Project 347 PN 173 H700701D
SR 347 at Union Pacific Railroad
Maricopa Road
State Route 347
John Wayne Parkway
Tucson District – Pinal County

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	iii		
1.0 INTRODUCTION	1-1		
1.1 Forward	1-1		
1.2 Project Need	1-2		
1.3 Project Objectives	1-3		
1.3.1 The Feasibility Study	1-3		
1.3.2 The Scoping Process	1-3		
1.3.3 The Feasibility Report / Environmental Overview	1-3		
1.3.4 Issues, Concerns and Opportunities (ICO's)	1-4		
1.4 Characteristics of the Corridor	1-4		
1.4.1 History of the Study Route	1-5		
1.4.2 Description of the Project Area	1-5		
1.4.3 Vision for the Project Area	1-5		
2.0 TRAFFIC AND CRASH DATA	2-1		
2.1 Introduction	2-1		
2.2 Existing Conditions	2-1		
2.2.1 Traffic Count Data	2-1		
2.2.2 Crash Summary	2-1		
2.3 2020 Traffic Forecasts	2-2		
3.0 MAJOR DESIGN FEATURES	3-1		
3.1 Introduction	3-1		
3.2 Roadway Configurations	3-1		
3.3 Design Controls	3-1		
3.4 Access Control	3-1		
3.5 Right-of-Way	3-1		
3.6 Other property ownership within the project area	3-1		
3.7 Drainage	3-1		
3.7.1 Existing Conditions / Features	3-1		
3.7.2 Proposed improvements	3-2		
3.8 Structures Considerations	3-2		
3.9 Geotechnical	3-3		
3.10 Utilities	3-4		
3.11 Union Pacific Railroad	3-4		
3.11.1 Existing Facilities	3-4		
3.11.2 Planned Facilities	3-4		
3.11.3 Design Requirements	3-5		
3.11.4 SR 347 Over/Under UPRR	3-5		
3.12 Amtrak	3-5		
3.12.1 Existing Facilities	3-5		
3.12.2 Design Requirements	3-5		
3.13 City of Maricopa General Plan Elements in Project Area	3-6		
3.13.1 Old Town Redevelopment Area	3-6		
3.13.2 John Wayne Parkway Signature Street	3-6		
3.13.3 Trails / Paths	3-6		
3.14 Constructability of Traffic Control	3-7		
4.0 ALTERNATIVES EVALUATED	4-1		
4.1 Introduction	4-1		
4.2 Key Design Goals	4-1		
4.3 Alternatives Selection Process	4-1		
4.4 Option 1 – “MCGH Under SR 347”	4-2		
4.4.1 General Description	4-2		
4.4.2 Option 1 Costs	4-3		
4.4.3 Possible Refinements for Option 1	4-3		
4.4.4 Option 1 – Advantages and Disadvantages	4-3		
4.5 Option 2 – “MCGH Disconnect to Honeycutt Road”	4-6		
4.5.1 General Description	4-6		
4.5.2 Option 2 Costs	4-6		
4.5.3 Possible Refinements for Option 2	4-6		
4.5.4 Option 2 – Advantages and Disadvantages	4-6		
4.6 Option 3 – “Honeycutt Road Disconnect into MCGH”	4-9		
4.6.1 General Description	4-9		
4.6.2 Option 3 Costs	4-9		
4.6.3 Possible Refinements for Option 3	4-9		
4.6.4 Option 3 – Advantages and Disadvantages	4-9		
4.7 Option 4 – “Trumpet Interchange”	4-12		
4.7.1 General Description	4-12		
4.7.2 Option 4 Costs	4-12		
4.7.3 Possible Refinements for Option 4	4-12		
4.7.4 Option 4 – Advantages and Disadvantages	4-12		
4.8 Option 5 – “SR347-MCGH Phased TI”	4-15		
4.8.1 General Description	4-15		
4.8.2 Option 5 Costs	4-15		
4.8.3 Enhancements / Adjustments for Option 5	4-15		
4.8.4 Option 5 – Advantages and Disadvantages	4-15		
4.9 SR 347 – Union Pacific Railroad Grade Separation-Over vs. Under / Structures	4-18		
4.9.1 Introduction	4-18		
4.9.2 UPRR Grade Separation Over vs. Under – Findings and Recommendations ...	4-19		
4.10 Alternatives Considered and Eliminated	4-19		
4.11 Evaluation Criteria	4-19		
4.12 Evaluation Matrix	4-20		

5.0	ENVIRONMENTAL OVERVIEW FOR STATE ROUTE 347 AND THE UNION PACIFIC RAILROAD GRADE SEPARATION	5-1
5.0	Introduction.....	5-3
5.1	Affected Environment.....	5-3
5.1.1	Physical and Natural Environment	5-3
5.1.2	Socioeconomic Environment	5-4
5.1.3	Cultural Resources (records/lit review)	5-5
5.2	Environmental Concerns.....	5-5
5.2.1	Physical and Natural Environment	5-5
5.2.2	Socioeconomic	5-6
5.2.3	Cultural Resources	5-6
5.3	Conclusion	5-6
5.4	Consultation/Coordination.....	5-7
5.4.1	Coordination	5-7
5.4.2	Public Involvement	5-8
6.0	IMPLEMENTATION.....	6-1
6.1	Introduction.....	6-1
6.2	Implementation Goals.....	6-1
6.3	Schedule Considerations.....	6-1
6.4	Funding Considerations	6-1
6.5	Interim Project Opportunities	6-2
6.6	Recommendations for “Next Steps”	6-2

LIST OF APPENDICES

APPENDIX A.....	A-1 TO A-29
Roadway Design Parameters	
APPENDIX B	B-1 TO B-4
Traffic Data	
APPENDIX C	C-1 TO C-16
Plans, Typical Sets, Bridge Sheets	
APPENDIX D.....	D-1 TO D-8
Other Alternatives	
APPENDIX E	E-1 TO E-3
Geotechnical and Tunneling Memoranda	
APPENDIX F.....	F-1 TO F-24
Environmental Overview Appendices	

LIST OF FIGURES

Figure 1-1	Location Map.....	1-1
Figure 1-2	Project Vicinity Map.....	1-2
Figure 2-1	2006 Daily Traffic Counts	2-1
Figure 2-2	Crash Locations	2-1
Figure 2-3	Crash Frequency and Rate	2-2

Figure 2-4	Future Roadway Classifications	2-3
Figure 2-5	Future Traffic Projection.....	2-4
Figure 3-1	Aerial photo of Amtrak Maricopa Station	3-5
Figure 3-2	Excerpt from General Plan showing Old Town Redevelopment Area.....	3-6
Figure 3-3	Excerpt from General Plan showing Community Features in Project Area	3-7

LIST OF TABLES

Table 1-1	City of Maricopa Population Growth	1-3
Table 1-2	City of Maricopa Traffic Projections.....	1-3
Table 2-1	SR 347 Historical Traffic Counts	2-1
Table 2-2	Crash Data Summary	2-2
Table 4-1	SR 347 <u>over</u> UPRR	4-18
Table 4-2	SR347 Under the UPRR – Increase in Project Costs.....	4-19
Table 4-3	SR 347 <u>Under</u> UPRR	4-19
Table 1	Listed Sites.....	5-4

Executive Summary

Introduction

This Feasibility Report / Environmental Overview (FR/EO) documents the results of an investigation of alternatives for grade separating State Route (SR) 347 from the Union Pacific Railroad (UPRR) in the City of Maricopa, Arizona.

The purpose of the investigation is to develop and evaluate various alternatives for achieving the grade separation. The process considered existing and future traffic requirements, community impacts, environmental considerations, and the need to provide a project which helps address the long-term regional transportation needs of the community. This FR/EO presents five options for achieving the project goals, and evaluates each based on a range of criteria including cost, effectiveness, and community impacts. Recommendations for moving the project forward are also presented, along with concepts for phasing construction and ideas for funding.

SR 347 and Other Project Roadways

State Route (SR) 347 crosses the Union Pacific Railroad (UPRR) in the City of Maricopa, Arizona. Known as John Wayne Parkway within the City of Maricopa, SR 347 is the area’s primary north-south corridor and most direct route to the Phoenix area. Originally paved and accepted into the state system in the 1950’s, the roadway was upgraded to a five-lane facility in the early 1990’s.

Other important roadways in the project area include:

- Edwards Avenue / McDavid Road, which intersects SR 347 just south of the UPRR, and serves growing residential areas to the west.
- Maricopa-Casa Grande Highway (MCGH), which intersects SR 347 just north of the UPRR and runs to the City of Casa Grande, and is a major arterial serving the area southeast of the project.
- Honeycutt Road, which connects with SR 347 approximately 600 feet north of the UPRR, and is a key arterial serving fast growing residential areas to the east.

All of these roadways lie within the project area, and all are evolving from rural, agricultural roads to important arterial streets as the Maricopa area grows.

The Union Pacific Railroad and Amtrak

The UPRR’s Sunset Line crosses SR 347 in the center of the Maricopa community, and is one of the railroad’s few trans-continental routes. The Sunset Line at this location consists of a single track with a siding track immediately west of the SR 347 crossing. The UPRR is in the process of double-tracking the Sunset Line, and the second rail line should be in place within the next one to two years. The UPRR has advised of a possible future third track at this location, and have asked that any plans for grade separating SR 347 provide space for the third line.

The Sunset Line is one of UPRR’s key freight corridors, and currently over 60 trains per day pass through the UPRR-SR 347 intersection at speeds typically in excess of 50 mph. Each time a train passes through this intersection SR 347 traffic is stopped for several minutes, resulting in delays and congestion, and frequently blocking SR 347 intersections with other key roadways in the area.

Amtrak’s Maricopa Station is located immediately northeast of the SR 347-UPRR crossing. This is Amtrak’s key station serving central Arizona including the Phoenix area. Currently six Amtrak trains per week make scheduled stops at the Maricopa Station, typically taking five to ten minutes to load and unload passengers and baggage. The Amtrak loading platform is located approximately 120 feet east of the SR 347 crossing; since the Amtrak trains normally extend through the intersection, these also cause back-ups and congestion.

The City of Maricopa and the Ak-Chin Community

Maricopa is one of the fastest growing communities in the nation. The area was originally settled in the late 1800’s as an agricultural and railroad community, and remained mostly a farming community until the 1990’s. Since then it has evolved as a bedroom community for the Phoenix metropolitan area and, in 2003, it was incorporated and became a city.

The City of Maricopa is expected to continue to grow quickly. Its population is projected to increase from approximately 16,000 residents in 2005 (per the special census) to nearly 180,000 by 2020. This rapid growth has stressed the community’s infrastructure, especially its roadways.

In addition to planning for transportation infrastructure, the City of Maricopa adopted its first General Plan in 2006. That plan includes important elements in the vicinity of the SR 347-UPRR crossing, including constructing John Wayne Parkway (SR 347) as a “signature street”, establishing the “Old Town Redevelopment Area” in traditional Maricopa commercial area, and providing trail and bikeway improvements. Any projects developed in the vicinity of the SR 347-UPRR intersection need to consider these proposed community amenities.

In addition to growth in the City of Maricopa, the Ak-Chin Indian Community, whose northern border lies about a mile south of the SR 347-UPRR crossing, is also developing. The Harrah’s Ak-Chin Casino and Resort is a major attraction in the area, reportedly drawing over three million visitors annually. The majority of these visitors, plus many in the casino’s work force travel via SR 347 from the north, another contributor of traffic needing to cross the UPRR tracks.

Project Need

As a result of regional growth, the SR 347-UPRR crossing is quickly becoming a major cause of delays and congestion, as increasing numbers of cars, trucks and buses are required to stop and wait while the 60-plus daily freight trains and six weekly Amtrak trains block the crossing. These queues on SR 347 frequently extend into the intersections with other roadways, including important arterials such as the Maricopa-Casa Grande Highway and Honeycutt Road, resulting in additional back-ups and delays. Because there are no alternative crossings of the UPRR, emergency vehicles are forced to wait with all other traffic to respond to critical situations on opposite sides of the tracks. This situation is highly undesirable, and will get worse at an exponential rate.

The Study Process

In early 2006 the City of Maricopa and ADOT embarked on a study to determine a solution for the SR 347-UPRR intersection situation. The goals of the project included:

- Provide grade separation between SR 347 and the UPRR
- Maintain and upgrade SR 347 connections with other key roadways in the area
- Consider other regional road network needs including especially improvements being evaluated for the Maricopa-Casa Grande Highway, a possible new corridor along the west side of the City, and other improvements being evaluated in an updated version of the City of Maricopa Small Area Transportation Study, now underway
- Consider other community-planned improvements, e.g. those discussed in the City’s General Plan
- Consider likely environmental impacts

Key elements of the study process included two public meetings, one agency scoping meeting, and a concepts workshop. Over 25 alternatives were developed; from these five were selected for detailed study, and are presented in this report. Additionally, the option of the depressing SR 347 under the UPRR, versus the more common elevated grade separation, is evaluated.

Options

Following are brief descriptions of the five options which are presented and evaluated in this report. See Section 4 and Appendix C for drawings and more detailed information on the options.

Option 1: “MCGH under SR 347”: This option features a longer (compared to the other options) SR 347 bridge over the UPRR and the Maricopa-Casa Grande Highway, which is extended to the northwest along its current alignment, then routed north and then back east to connect with SR 347 approximately one-half mile north of the UPRR. Honeycutt Road is connected to MCGH east of SR 347, and the SR 347 is “straightened out” south of the UPRR, and reconnected with the major streets.

Option 2: “MCGH Disconnect to Honeycutt Road”: The main feature of this option is MCGH which is realigned to head north and connect with Honeycutt Road approximately one-quarter mile east of SR 347. This removes one major intersection from the SR 347-UPRR intersection area. South of the tracks SR 347 is realigned to the east and reconnected with the major streets. Possible future improvements include additional east-west UPRR crossings of the MCGH and Honeycutt Road.

Option 3: “Honeycutt Road Disconnect into MCGH”: In this option MCGH and Honeycutt Road are realigned to intersect one-quarter mile east of SR 347, and the realigned MCGH bends to intersect SR 347 at approximately the Honeycutt Road alignment. A possible future improvement would be to extend the new MCGH to the west with an additional crossing of the UPRR.

Option 4: “Trumpet Interchange”: This option provides a high-capacity interchange between MCGH and SR 347. Honeycutt Road is realigned to connect with MCGH approximately one-quarter mile east of the interchange. Two bridges over the UPRR are required – one for SR 347, and one for the northbound-southeast-bound ramp.

Option 5: “SR 347-MCGH Phased TI”: Main features of this alternative include a realignment and UPRR grade separation for the MCGH, and a new SR 347-MCGH intersection south of the UPRR. This option also includes a high capacity extension of MCGH to the west. The main SR 347-UPRR intersection could be phased to ultimately provide a diamond or Single Point Urban Interchange (SPUI).

Evaluation of Alternatives

In evaluating the alternatives developed for grade separating SR 347 and the Union Pacific Railroad, it should be noted that the City of Maricopa is currently completing an update of its Small Area Transportation Study (SATS). The SATS will identify existing and new roadway corridors to be developed in the Maricopa area, and will clarify the transportation network in which this grade separation project will need to fit. More accurate comparison of the more promising grade separation alternatives, including a truer understanding of the “footprint” of the project, will be possible after the SATS is completed, sometime later in 2007.

A detailed evaluation of the options is included in Section 4. A summary follows at the end of this Executive Summary.

Over versus Under the UPRR

Depressing SR 347 under the UPRR is a viable alternative for project Options 2, 3 and 5. A detailed discussion of the advantages and disadvantages of taking SR 347 under versus over the UPRR is included in Section 4. These are summarized below:

Advantages of going under:

- Reduces roadway noise
- Reduces roadway visibility in a sensitive area of the City
- May shorten the SR 347 impact area – vertical clearance required for vehicles less than for the railroad, meaning the “touch-down” points of SR 347 are nearer to the UPRR than the over option.

Disadvantages of going under:

- Increases project costs by \$5-10 million
- Will increase time required for UPRR review and approval of designs by 6 to 12 months
- Will require pump station for drainage; introduces additional operating cost and maintenance requirements.
- Significant impact to UPRR operations
- Significant impact to Amtrak station which might be avoided with over option
- Longer construction duration – need to construct rail shooflys first

	Option 1: “MCGH under SR 347”	Option 2: “MCGH Disconnect to Honeycutt Road”	Option 3: “Honeycutt Road Disconnect into MCGH”	Option 4: “Trumpet Interchange”	Option 5: “SR 347-MCGH Phased TP”
<u>Costs (1) (2)</u> Construction: Engineering: Right-of-Way: Total:	<u>High</u> \$58.0 million \$5.7 million <u>\$18.7 million</u> \$82.4 million	<u>Moderate</u> \$44.9 million \$4.4 million <u>\$12.3 million</u> \$61.6 million	<u>Moderate</u> \$45.7 million \$4.5 million <u>\$12.8 million</u> \$63.0 million	<u>High</u> \$60.9 million \$6.0 million <u>\$19.2 million</u> \$86.1 million	<u>Verv High</u> \$84.7 million \$8.4 million <u>\$20.5 million</u> \$113.6 million
Traffic Operations / Capacity (at design year – 2030)	Best: Results in the least design-year delay of the five options.	Poor / Average: Congestion / delays, although substantially improved over existing, will increase faster than other options.	Poor / Average: Congestion / delays, although substantially improved over existing, will increase faster than other options.	Fair: Less delay than options 2 and 3.	Good: Results in next to best performance.
Phase-ability (viability of early projects to expedite some improvements / relief, without increasing overall costs)	Poor: major elements, including the UPRR/MCGH bridge, need to be built in initial phase.	Best: Early, high-value projects, e.g. connecting MCGH to Honeycutt Road, can be expedited to provide early relief.	Good: Honeycutt/ MCGH realignment good but would require major r-o-w acquisition.	Poor: Entire project needs to be built at once; few opportunities for phasing.	Poor: As drawn, all major project components (including two RR crossings) need to be built with initial project.
Community Impacts (commercial / residential impacts; trails / path connectivity;	Significant: “Extended MCGH” would create a large downtown “island” around the commercial district; although this would provide good access, it would also isolate the area somewhat; connectivity may be an issue.	Moderate: Commercial areas along SR 347 may be impacted some, but main areas and neighborhood north of Amtrak station would remain; connectivity should be okay.	Significant: Although commercial area west of SR 347 would remain largely intact, residential area north of Amtrak station would be wiped out; connectivity should be okay.	Major: The trumpet interchange would significantly impact areas east and west of SR 347; connectivity would be poor.	Moderate: Locating major intersection on undeveloped land south of UPRR would minimize impacts to commercial / residential areas north of the railroad; connectivity should be best of options.
Summary	<u>Marginal option:</u> <ul style="list-style-type: none">Extended MCGH cleans up traffic operations at the UPRR but creates significant out-of-direction travelCommercial “island” could be problematic for city plannersHigh initial costFew opportunities for phasingMay present issues for connectivity	<u>Good option:</u> <ul style="list-style-type: none">Reasonable initial cost with good opportunities for phasingNext to fewest for community impactsGood opportunities for future upgradingAlthough traffic benefits are less than other options, huge improvement over no-build, and does have good opportunity for future upgrading	<u>Good option:</u> <ul style="list-style-type: none">Reasonable initial cost with good opportunities for phasingCommunity impacts significant but may be tolerableGood opportunities for future upgradingAlthough traffic benefits are less than other options, huge improvement over no-build, and does have good opportunity for future upgrading	<u>Poor option:</u> <ul style="list-style-type: none">High initial cost with few opportunities for phasingSignificant community impacts, including to neighborhood, commercial areas, and for connectivityGood opportunities for future upgradingAlthough traffic benefits are less than other options, huge improvement over no-build, and does have good opportunity for future upgrading	<u>Moderate option:</u> <ul style="list-style-type: none">High initial cost with few opportunities for phasingGood long-term capacityFewest community impacts

Notes:

- (1) Costs for right-of-way are assumed at \$500,000 / acre.
(2) All costs assume “SR 347 over” the UPRR option.

Recommendations

Much work remains to determine the optimum option to take into implementation, including more public input on the options, further review of funding alternatives, and, especially, better definition of how this project fits with the long-term regional transportation network. Nonetheless, a couple of recommendations can be made at this point, to eliminate some of the options, to streamline the selection effort. These recommendations include:

Drop the SR 347 under the UPRR concept. The concept of depressing SR 347 under the UPRR will increase project costs by at least \$5 million. It will also delay project opening by approximately a year, the result of additional time for reviews and approvals by the UPRR, plus additional time for relocation of underground utilities and construction of the UPRR shoofly. It will also introduce the long-term expense of operating a pump station. This expenditure of time and money might be worthwhile if the project was in the middle of a sensitive resource area or community center; that is not the case with SR 347 at the UPRR. This project is near what the city plans to make a city commercial and cultural center, i.e. the “Old Town Redevelopment Area”; however, this redevelopment is not well defined, and this project – and a railroad overpass, would be on the extreme fringe of the area. The City would be well advised to invest the money saved by NOT depressing SR 347 under the UPRR, i.e. \$5-10 million, on other community projects.

Drop Option 4 “Trumpet Interchange” from further consideration. The trumpet interchange, while providing good mobility between SR 347 and the MCGH, wreaks havoc in the traditional Maricopa commercial center. It is expensive and provides no good opportunities for connections to the west or any other upgrades, and no opportunities for interim projects or phased implementation.

Keep key ADOT Sections informed as the project progresses. Future developers of this project (Design Concept Report and Final Design) should keep in mind the lead time required for some ADOT projects. For example, it may take two years (or longer) to acquire the right-of-way for the project. Also, some ADOT services, e.g. Geotechnical Operations Section (for geotechnical field investigations and pavement coring) may have resources to support further development of the project.

Consider interim projects to ease congestion until the ultimate project is constructed. Due to the length of the typical scoping and design processes for ADOT projects, it is recommended that the City of Maricopa and ADOT explore interim projects to reduce the number or duration of traffic stoppages on SR 347. One concept, which was discussed during development of the Feasibility Report, was to relocate the Amtrak loading platform to the east so that Amtrak trains stopped to load / unload would not extend across SR 347. This project could be accomplished at a reasonable cost, and would eliminate back-ups when the Amtrak trains are stopped; these stoppages can be for up to several minutes long. Amtrak and UPRR representatives are receptive to this idea.

Future Steps

The steps taken to move toward implementation of this project include the following:

- Completion of the Maricopa Small Area Transportation Study (SATS): completion of the SATS will clarify how this grade separation project, including the realignment and upgrading of intersecting roadways, fits in with the future or ultimate transportation network for the Maricopa area.
- Final evaluation of the grade separation options, taking into consideration the SATS findings and recommendations: following completion of the SATS, the most viable options for the grade separation should be revisited, and the analyses and comparison updated to determine the optimum solution.
- Continued partnership between the City of Maricopa and ADOT: The City and ADOT will continue the cooperative relationship developed during the preparation of the Feasibility Report. Important issues to be addressed after completion of the City’s SATS include: development of time frame for future engineering studies and environmental documents; cost sharing; and determination of future scoping and responsibilities (lead agency and funding).

1.0 INTRODUCTION

1.1 Forward

This Feasibility Report / Environmental Overview (FR/EO) documents the results of an investigation of alternatives for grade separating the existing intersection between State Route (SR) 347 and the Union Pacific Railroad (UPRR), in the City of Maricopa, Arizona.

The project lies within Pinal County and the Arizona Department of Transportation’s (ADOT’s) Tucson District. The project lies wholly within the City of Maricopa, Arizona, one of the fastest growing communities in Arizona and the nation. SR 347 is also known as “John Wayne Parkway” within the Maricopa City limits.

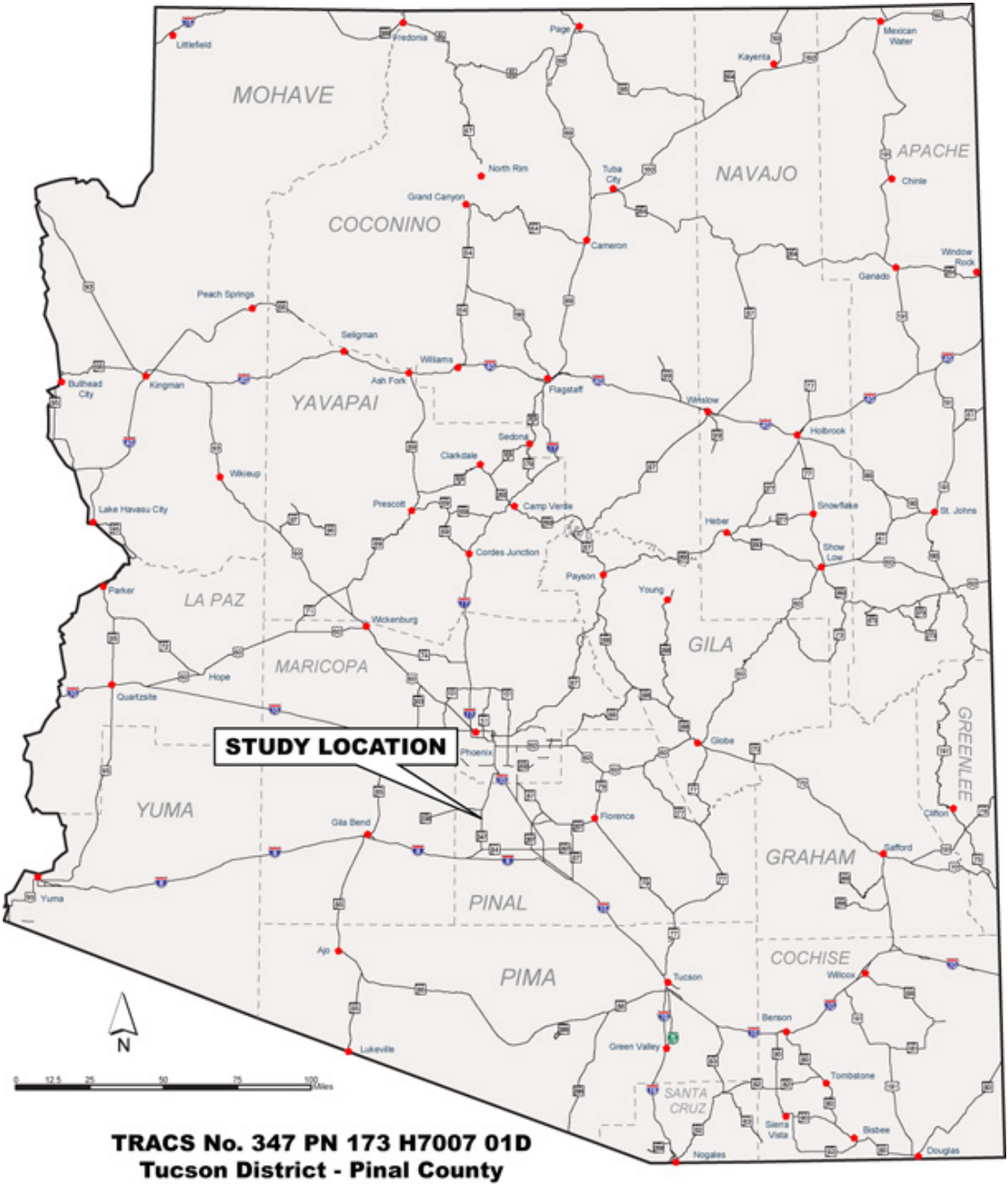


Figure 1-1 Location Map

The issues and challenges for SR 347, and virtually every other roadway in the project area, are largely the result of the increases in traffic resulting from explosive growth within the City and surrounding areas to the south and east.

Another significant traffic generator in the project area is the Ak-Chin Indian Community and Harrah’s Ak-Chin Casino and Resort. The northern boundary of the Indian Community and the casino are located slightly more than one mile south of the SR 347-UPRR intersection, and most of the visitors and employees come via SR 347 from the Phoenix area.

As a result, traffic on SR 347 has grown exponentially. In some cases roadway capacity improvements that, ideally, would now be in place, have not even been planned.

The Union Pacific Railroad is also very active in this area. Currently 60 to 70 UPRR trains per day pass through this intersection, routinely stopping traffic for several minutes for each train. Traffic on SR 347 routinely backs up several hundred feet when trains are passing. These queues frequently block the nearby intersections with Edwards Avenue / McDavid Road, the Maricopa-Casa Grande Highway, and Honeycutt Road.

In addition, the Amtrak Maricopa Station is located adjacent to the SR 347-UPRR intersection, with six scheduled trains per week. These trains, when stopped to load and unload passengers, frequently extend into the intersection, routinely stopping traffic for several minutes, also causing queuing which blocks the nearby intersections.



SR 347 traffic frequently backs up for several hundred feet while waiting for UPRR trains to clear

With traffic volumes projected to further increase, addressing this SR 347 at-grade intersection with the UPRR is a high priority for city, ADOT and regional transportation officials.

Study Limits

The focal point of this study is the existing at-grade intersection of SR 347 and the UPRR. The study limits extend approximately one-half mile north and south of the UPRR intersection. In addition, due to the likely profile changes to SR 347 and the need for upgrades to the regional roadway network, the study encompasses other arterial streets in the project area including Honeycutt Avenue, Edwards Avenue, the MCGH, and Honeycutt Road. The project area is shown in Figure 1-2.

The immediate impact area of the project includes a total of approximately one-half mile of SR 347 north and south of the roadway’s intersection with the UPRR. Other roadways in the project area that will be impacted include the following:

- Honeycutt Avenue – intersects SR 347 approximately one-quarter mile south of the UPRR intersection and runs west, primarily serving as access for Maricopa Schools and new subdivisions west of SR 347.
- Edwards Avenue / McDavid Road – intersects SR 347 four-hundred-fifty feet south of the UPRR, and serves new and planned residential subdivisions to the west.
- Maricopa-Casa Grande Highway (MCGH) - runs from its intersection with SR 347 three-hundred feet north of the UPRR tracks southeast to the City of Casa Grande and is a major arterial serving residential and other new development.
- Honeycutt Road – intersects SR 347 six-hundred feet north of the UPRR tracks and serves as an arterial for the fast growing area east of SR 347.
- Covington Road and Garvey Avenue – intersect SR 347 in the vicinity of Honeycutt Road and provide access to the older neighborhoods and commercial areas west of SR 347.

1.2 Project Need

Project Need is based on:

- 1) Recent and projected exponential population growth within the City of Maricopa and surrounding area, which is dramatically increasing traffic on SR 347 and the other roadways in the project area;
- 2) A high and increasing number of UPRR trains traveling the Sunset route and Amtrak trains stopping to load and unload passengers, all of which block the critical SR 347 lifeline for several minutes per crossing.
- 3) The need to improve safety and operational characteristics of the existing crossing by separating train and automobile traffic conflict points.

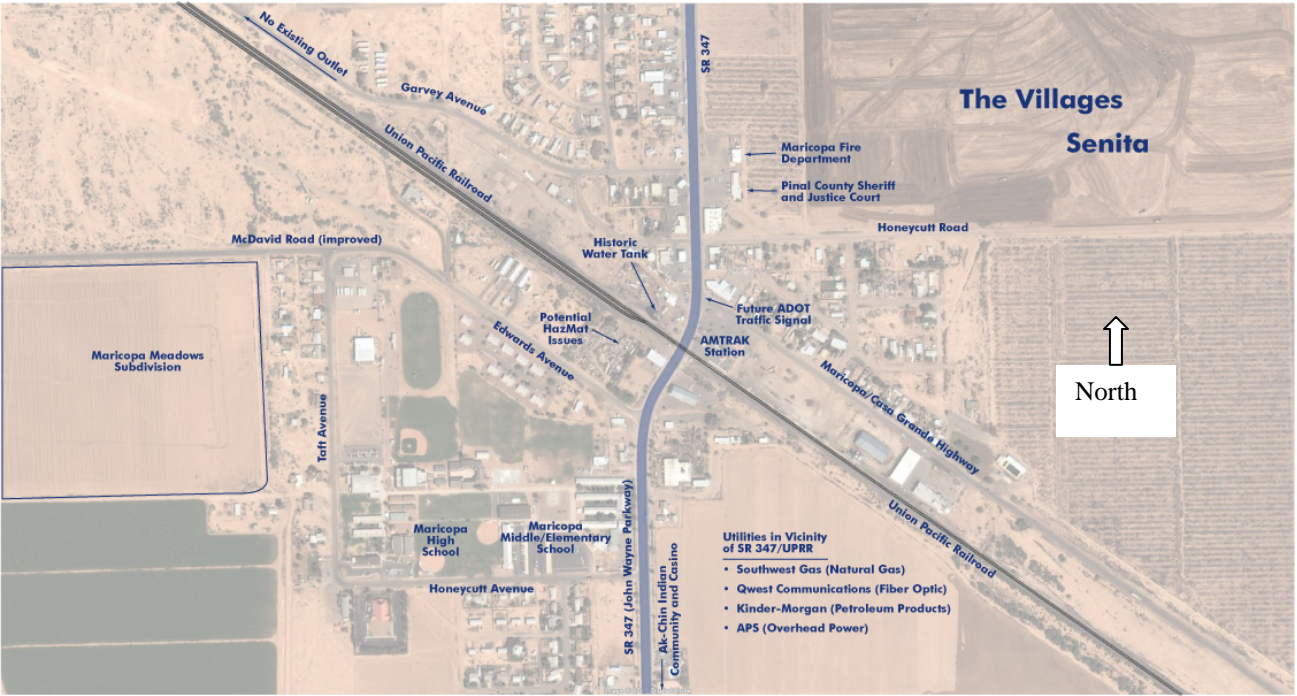


Figure 1-2 Project Vicinity Map

The congestion resulting from this at-grade crossing of the UPRR has grown and will continue to grow at an exponential rate. UPRR plans to add a second rail line for the Sunset Corridor that will attract additional trains to the area, will potentially double (or more) the number of trains, and allow for “back-to-back” train crossings to occur, which would result in even longer delays and backup of SR 347 traffic. Coupled with the proximity of other key roadways in the project area - Maricopa-Casa Grande Highway and Honeycutt Road, these delays will increasingly tie-up all vehicular traffic in the historic heart of Maricopa for several minutes, several times per day. This would be an unacceptable condition for local and regional commerce, and for emergency vehicles.

The City of Maricopa and adjoining areas have experienced, and are forecast to continue to see explosive growth as indicated in Table 1-1 below.

Table 1-1 – City of Maricopa Population Growth

Year	Population
2004	4,996
2005	15,934
2020	179,000 (projected)

As a result of this population growth, traffic on SR 347 in the project area will grow significantly, as indicated in Table 1-2. (See also Section 2 for more information).

Table 1-2 – City of Maricopa Traffic Projections

Roadway	Traffic (vpd)		Increase
	Existing	Future (2020)	
SR 347	15,000	65,000	433%
Honeycutt Road	5,400	30,000	556%
Maricopa-Casa Grande Highway	7,000	36,000	514%

As a result of the increases in vehicle and train traffic, traffic queues are increasing in length and duration every time a UPRR train passes through or Amtrak train stops. In addition to this congestion, these backups typically extend beyond the SR 347 intersections with Edwards Avenue (to the south) and the Maricopa-Casa Grande Highway (to the north), creating additional congestion and unsafe operating conditions.

1.3 Project Objectives

Due to the setting (in the heart and at the cross-roads of the City of Maricopa), its nature (a critical lifeline for traffic to and from the Phoenix area), and location (connecting with other critical regional traffic facilities in the area), the objectives of this SR 347-UPRR grade separation project are many and complex:

- Eliminate the existing SR 347-UPRR at-grade intersection;
- Improve (widen) SR 347 to its ultimate configuration, including at least six through-lanes and possibly “signature street” features;
- Maintain or enhance connections with other roadways and streets in the area, including most notably the Maricopa-Casa Grande Highway and Honeycutt Road;
- Accommodate other planned community features, including bike lanes, trails and a trailhead; and

- Accommodate future development, including traffic which is projected to grow by nearly 600% over the next 25 years.

This feasibility study, undertaken by the City of Maricopa and ADOT, is the first step in achieving these important objectives.

1.3.1 The Feasibility Study

City of Maricopa staff, shortly following incorporation of the City in 2003, recognized that grade separating the SR 347-Union Pacific Railroad intersection should be a top priority among transportation improvements in the City. To this end, they approached ADOT with a partnership offer to study and initiate action to get this critical transportation issue addressed. The purpose of this study is to develop and evaluate alternatives for grade-separating the SR 347 – Union Pacific Railroad intersection, including maintaining connections with other roadways in the area. This study will determine the feasibility of various options for achieving these results and provide information on costs, impacts, and design requirements, so that the project may be promoted for funding and construction.

1.3.2 The Scoping Process

The purpose of the scoping process is to identify potential issues, concerns and opportunities that should be considered in the Feasibility Report / Environmental Overview. The scoping process for this project involved representatives from virtually all agencies and private organizations which may be impacted by the project, as well as the general public. Key elements of this process included:

- Two public meetings, which included presentations on the project setting, goals, and proposed options;
- One agency scoping meeting, to determine issues, concerns, and opportunities of the many agencies and operating in the project area;
- One “concepts workshop”, during which multiple project alternatives were presented and discussed by key stakeholders including the City, ADOT, and Federal Highways Administration (FHWA); and
- One “path forward” meeting, again with representatives from the City, ADOT Predesign and Tucson District, FHWA, and the Ak-Chin Indian Community.

More information on the scoping meetings is included in the Environmental Overview portion of this report (Section 5).

1.3.3 The Feasibility Report / Environmental Overview

The purpose of this Feasibility Report / Environmental Overview (FR/EO) is to document the development and evaluation of alternatives for providing a grade separation at the intersection of SR 347 and the Union Pacific Railroad. Key elements of this study include:

- 1) Traffic analyses and forecasts for SR 347 and the other key roadways in the project area.
- 2) Five options for achieving a grade separation between SR 347 with the UPRR and tying SR 347 to other area arterials to maintain access and critical route connections.

- 3) An evaluation for taking SR 347 under the UPRR, in order to assess the schedule and cost impacts of a “depressed” option.
- 4) A general assessment and comparison of benefits, costs and impacts of the alternatives.

The purpose of the environmental overview is to generally describe the social, economic and environmental character of the area in the vicinity of the SR 347-UPRR intersection in the City of Maricopa. This description can be used to identify potential “fatal flaws” and associated issues and to assist in the evaluation of alternatives for proposed improvements. The EO has been prepared in conjunction with the FR for the potential improvement project. It provides only a general description of environmental conditions and potential impacts. The information is based on existing data sources from various municipal, county, state, and federal agencies, as well as a windshield survey of the study area. The report is not intended to meet the requirements of the National Environmental Policy Act (NEPA). Additional environmental study and documentation will be required at future stages of project development. For additional information, refer to Section 5.0.

1.3.4 Issues, Concerns and Opportunities (ICO’s)

Several ICO’s were identified during the scoping process / meetings that were held:

Safety and Mobility ICO’s

- Cannot shut down SR 347 completely during construction – no other viable alternate north-south routes.
- Need to maintain traffic on Maricopa-Casa Grande Highway during construction.

Implementation ICO’s

- Can we construct an interim project to address the Amtrak trains blocking SR 347?
- Implementation of the SR 347 project needs to be coordinated with improvements to MCGH so that traffic restrictions on both roads are not obsessive.

Community ICO’s

- Aesthetics – do we really want the height of a highway overpass structure in our downtown area?
- Project needs to investigate and assess the local and historic characteristics of the proposed “Old Town Redevelopment” Area.
- The “Old Town Redevelopment Area” identified in the COM General Plan has not been studied yet and a specific area plan is not in place. The City realizes this area may be significantly impacted by this project.

Funding ICO’s

- ADOT funding for like projects is limited – there are many competing needs statewide.
- The City will likely need to come forward with a significant portion of the funding needed to construct the project.
- Highly recommended to follow the ADOT / Federal NEPA process, including for the environmental clearance, as this will keep the project eligible for federal funding.

- Other potential funding participants for the project include the UPRR, Pinal County, the Ak-Chin Indian Community and developers.

Project Development ICO’s

- During development of the Environmental Overview it was noted that the City of Maricopa should update their Small Area Transportation Study (SATS) due to the increase / change in traffic demands for the region.
- Final determination of the optimum alternative for the SR 347-UPRR grade separation project, including especially the road networks that this project will connect with, would best be developed after the update of the SATS.

A complete listing of ICO’s is included in the Environmental Overview portion of this report (Section 5).

1.4 Characteristics of the Corridor

SR 347 starts at I-8 and proceeds north through the agricultural areas and farming communities of middle western Pinal County. It intersects with SR 84 west of the community of Stanfield, then passes through the Ak-Chin Indian Community and into the City of Maricopa, intersecting with other regional roadways including the Maricopa-Casa Grande Highway and SR 238, which runs west to the community of Mobile and on to the City of Gila Bend. SR 347 crosses over the Gila River Indian Community (GRIC) north of Maricopa, and connects with I-10 at the “Queen Creek Road” interchange, approximately 5 miles south of the I-10 / SR 202L system interchange. It is the only north-south connector from Maricopa crossing GRIC lands, making it a critical lifeline for the city and its emerging communities to the south and east.

The topography along SR 347 is very flat, with the only significant drainage ways including the Santa Rosa Wash and the Gila River, both of which cross the highway on the GRIC.

The SR 347 corridor area has traditionally been an agricultural area. This has changed significantly since the early 1990’s, as growth from the Phoenix metro area has spilled across the GRIC, and transformed areas like the City of Maricopa into fast-growing bedroom communities.

The UPRR line was constructed in the project area in the 1870’s, originally as part of the Southern Pacific Railroad. Since then, it has been an important contributor to growth and development along its corridor and in the Maricopa community. Today, over 60 trains per day travel UPRR’s “Sunset” line, crossing over SR 347 in the heart of the City. The Amtrak Station located at the UPRR / SR 347 intersection serves the Phoenix area and is the only Amtrak station between Tucson and Yuma. Six Amtrak trains per week have scheduled stops at the Maricopa Station.

SR 347 also serves as an important link for the Ak-Chin Indian Community, which lies south of Maricopa. The Ak-Chin have experienced significant development in recent years, especially since the opening of its Harrah’s Ak-Chin Casino and Resort in the 1990’s. Today, the casino reportedly draws three million visitors per year, most of which arrive from the north via SR 347.

The roadways in the project area, including SR 347, have evolved from serving primarily as agricultural and local access roads, to serving a more important function in regional mobility. They now serve as major routes for commuters from new residential subdivisions to the Phoenix area.

1.4.1 History of the Study Route

Although the City of Maricopa was only incorporated in 2003, the area was settled in the late 1800’s, in part to serve the Southern Pacific Railroad Station. The wagon route between this railroad stop and the Phoenix area eventually became what is today SR 347.

SR 347 was originally paved by ADOT in the 1950’s. A Pinal County-sponsored program upgraded the roadway from a two-lane to a four/five-lane facility in the early 1990’s.

Since then, portions of SR 347 have been upgraded to six/seven lanes, particularly in areas adjacent to new residential developments and master-planned communities, such as Rancho El Dorado and Cobblestone Farms. In addition, some of the SR 347 intersections within the limits of the City of Maricopa have been widened and signalized. At its intersection with the UPRR SR 347 includes five lanes – two lanes in each direction and a center dual-left-turn lane/painted median.

Today, SR 347 is still the only direct north-south route to Phoenix from the City of Maricopa, the Ak-Chin Indian Community, and other developing areas to the south and east. SR 347 is classified as an urban arterial highway on the ADOT Functional Classification System but is not a National Highway System (NHS) route, and is not eligible to receive NHS funding. Within the limits of the City of Maricopa, SR 347 is officially known as the “John Wayne Parkway” and it continues to be upgraded as development occurs along its length.

SR 347 improvement projects in the vicinity of the project area are depicted in the following table:

Project No.	Construction Date	Description
S-347 (1)	1955	Roadway Paving
S-347 (3)	1955	Roadway Paving
RS-347-(15) P	1992	Roadway Widening

SR 347 is also a key corridor in the Maricopa-Ak-Chin-Casa Grande area, the transportation network which is rapidly emerging. Other corridors and networks currently being assessed for further development include:

- Maricopa-Casa Grande Highway – currently the focus of a study by the City of Maricopa and Pinal County.
- Southwest Maricopa and west Pinal Counties transportation needs and facilities are currently being assessed in the I-8/I-10 “Hidden Valley” Framework study, led by the Maricopa Association of Governments (MAG).
- Update and extension of the City of Maricopa’s Small Area Transportation Study (SATS) is also underway.

1.4.2 Description of the Project Area

The project area is defined as approximately one mile of SR 347, centered on its intersection with the Union Pacific Railroad “Sunset” Line. This essentially is the stretch of SR 347 from south of its intersection with Honeycutt Avenue, north to north of Garvey Avenue. The entire project area lies within the City of Maricopa, Pinal County and ADOT’s Tucson District.

At its intersection with SR 347, the UPRR operates a single track located within a 375-foot right-of-way. This is one of the railroad’s most important trans-continental routes, and currently over 60 trains per day cross the SR 347 intersection. The UPRR has advised of plans to add a second rail line for this route in the near future, and that space be reserved for a possible future third rail line. The existing five-lane section of SR 347 crosses the UPRR right-of-way approximately centered within a 100-foot easement.

An Amtrak Station is located on UPRR right-of-way immediately northeast of the SR 347-UPRR crossing. The station includes a modular administrative building, a concrete loading / unloading platform immediately adjacent to the UPRR tracks, and a parking area. The Amtrak facility also features a preserved UPRR “California Zephyr” passenger railcar. This railroad car was placed at this location as part of a recent ADOT Transportation Enhancement project.

Surrounding the SR 347-UPRR intersection is the traditional Maricopa commercial area, including grocery and variety shops, and gas stations.

The Maricopa Schools complex is located approximately one-quarter mile southwest of the SR 347-UPRR intersection. This complex includes facilities for elementary through high school students. The primary vehicle access to the schools complex is via Honeycutt Avenue, which intersects SR 347 one-quarter mile south of the UPRR crossing.

A Pinal County / Maricopa City complex lies approximately one-quarter mile north of the UPRR crossing. This facility includes sheriff and other county offices. This was also the initial, temporary location of the Maricopa City Hall until its recent relocation to a larger facility, and remains the main office and equipment facility for the City’s Fire Department.

North of the UPRR crossing, outside the limits of the small commercial areas lining SR 347, are small, older neighborhoods. To the southeast, south of the tracks, lies undeveloped agricultural land.

1.4.3 Vision for the Project Area

The SR 347 / UPRR intersection is located in the heart and at the crossroads of the burgeoning City of Maricopa. The vision for the area can be summarized as follows:

- SR 347, officially known as “John Wayne Parkway” within the City of Maricopa, is the city and area’s primary north-south corridor. It is, and must continue to serve as the region’s most important roadway to the Phoenix metro area.
- The Union Pacific Railroad Sunset line is one of the railroad’s three transcontinental routes, and train traffic is expected increase. This railroad line was operating well before settlement of the Maricopa community, and the UPRR has every right, and will continue to operate, improve and expand its facilities within this corridor.
- Two primary adjoining roadways – the Honeycutt Road and the Maricopa-Casa Grande Highway – are slated to operate as major arterial streets / parkways in the future and will be upgraded and continue to funnel increasing volumes of traffic into the SR 347 corridor.



The UPRR'S Sunset Line is one of their few Trans-Continental lines with over 60 trains per day at 60 MPH

- The project is in the heart of the City’s traditional business district, a key commercial and cultural center for this young community. City planners recognize the unique value of this area, and the 2006 General Plan initiatives for it include 1) reconstruction of SR 347 (John Wayne Parkway) as a “signature street”, 2) preservation and improvement of the Maricopa “Old Town” Redevelopment area, and 3) providing a cross-roads for major new trail and bikeway networks.

As a result of all these plans for SR 347 and the project area, this project becomes more than a simple grade separation project; it needs to consider, incorporate, and even be the catalyst for critical transportation and community improvements. In short, the SR347-UPRR grade separation project needs to:

- Improve safety and mobility by providing a grade separation with the UPRR;
- Support City and regional needs for improved mobility, including major connections with the other critical arterial corridors;
- Include or allow for future community features planned in the project area, including trails, paths and a signature street.

- Include provisions for multi-modal access.

Key elements of this vision are addressed or considered in the development of the project options presented in this feasibility report.

2.0 TRAFFIC AND CRASH DATA

2.1 Introduction

Traffic conditions were summarized for both existing operations and 2020 traffic forecasts. Historical count data, in addition to crash data, was obtained for the study area. As such, there is significant development that is occurring in and around the City that is impacting traffic operations along SR 347 at the current UPRR crossing. This increased growth is occurring at a rapid rate, creating not only safety issues at the crossing but degradation of traffic operations along SR 347.

The recent Maricopa Small Area Transportation Study (SATS) dated July 2005 and related travel demand model were utilized to develop forecasts for bridge options at the rail crossing. Additionally, the Pinal County travel demand model developed as part of the County’s SATS in 2006 and the Casa Grande SATS model were utilized in enhancing the Maricopa SATS model.

An existing traffic condition summary is provided below in addition to the assumptions and resulting traffic forecasts developed for the five (5) bridge crossing alternatives.

2.2 Existing Conditions

2.2.1 Traffic Count Data

Traffic count data was obtained from the City and ADOT. Recent traffic counts were collected on March 7, 2006 throughout the City including along SR 347. Figure 2-1 summarizes these counts. Historical counts along SR 347 were also obtained from ADOT and are summarized in Table 2-1. As can be seen, traffic flow along SR 347 has increased 67% from 2003 to 2005 between Maricopa Casa Grande Highway and SR 238. In comparing with the counts conducted in March 2006, traffic on SR 347 north of SR 238 has nearly tripled since 2003 and has risen 54% since 2005.

As the explosive growth continues, particularly south of UPRR, traffic at the SR 347-UPRR intersection will also increase, as this is the only major north-south roadway that provides regional connectivity to the Phoenix metropolitan area.



Figure 2-1. 2006 Daily Traffic Counts (# of vehicles)

Table 2-1. SR 347 Historical Traffic Counts						
Beginning Milepost	Ending Milepost	SR 347 Roadway Section	Length (miles)	Annual Average Daily Traffic (AADT)		
				2003	2004	2005
171.50	173.46	Farrell Road – Maricopa Casa Grande Highway	1.96	11,000	13,400	9,400
173.46	174.56	Maricopa Casa Grande Highway – SR 238	1.10	12,000	18,600	20,000
174.56	187.51	SR 238 – Maricopa Road North	12.95	18,500	29,000	31,400

Source: ADOT Traffic Data Section

2.2.2 Crash Summary

A crash analysis was conducted using collision data along SR 347 on a three-mile segment south of Bowlin Road (Milepost 172) to north of SR 238 (Milepost 175). Crash data was obtained from ADOT Traffic Safety Division for the most recent three-year period available; March 1, 2003 through February 28, 2006. The crash data is summarized in Table 2-2.

There were 116 reported accidents, which consists of thirty (30) intersection related crashes and 86 mid-block accidents. The intersections on SR 347 at Maricopa Casa Grande Highway (MCGH), SR 238, Honeycutt Avenue, Honeycutt Road, Edwards Avenue and Hathaway Avenue had twelve (12), eight (8), five (5), three (3), one (1) and one (1) crashes, respectively. These crashes occurred within a 250-foot radius of an intersection. Crash type at intersections attributed to 30% rear-end, 27% angle, 13% left-turn, 10% backing, 7% sideswipe, 3% single-vehicle and 10% other crashes. These intersections experienced a 66% increase in crashes between years in the first two years and a 340% increase in the third year (2005-06).

Out of 86 mid-block crashes within the three mile roadway segment (between milepost 172 and 175), 78 crashes occurred between Smith-Enke Road and Bowlin Road as shown in Table 2-2. There were two (2, 3%) fatal crashes, ten (10, 13%) injury type and sixty-six (66, 84%) non-injury or property damage only crashes reported during three-year analysis period. Mid-block crashes increased by 53% in the first half and 74% in the second half of the three year period. twenty-four (24) mid-block crashes occurred between SR 238 and Edison Road, a half mile segment, and nineteen (19) mid-block crashes within the half mile between Edison Road and MCGH. The segment between MCGH and Honeycutt Avenue had twenty-one (21) crashes, whereas there were fourteen (14) reported crashes between Honeycutt Avenue and Bowlin Road.

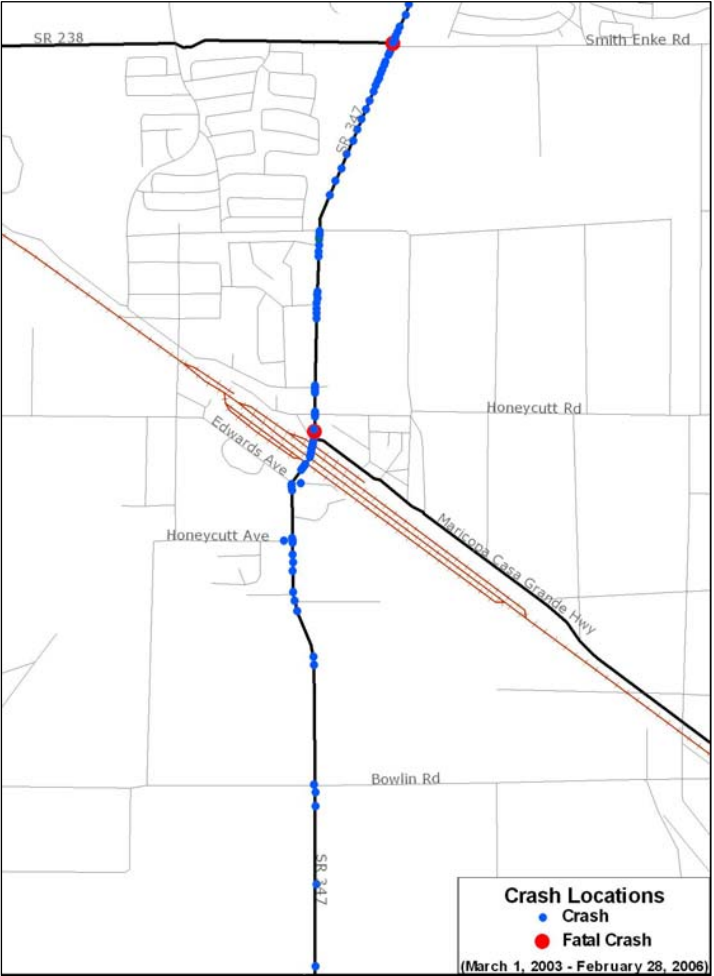


Figure 2-2. Crash Locations

The predominant crash types were angle (31%), and rear-end (30%) crashes, followed by single-vehicle (16%), sideswipe (10%), left-turn (9%) and other (4%) crashes. Figure 2-2 shows crash locations.

Crash rates are calculated based on Average Daily Traffic (ADT) volumes, segment length and number of reported crashes. Results showed that the segment between MCGH and Honeycutt Avenue had a crash rate of 4.65 crashes/million vehicle miles (MVM) of travel. Figure 2-3 illustrates the crash rates on SR 347 within the study segments.

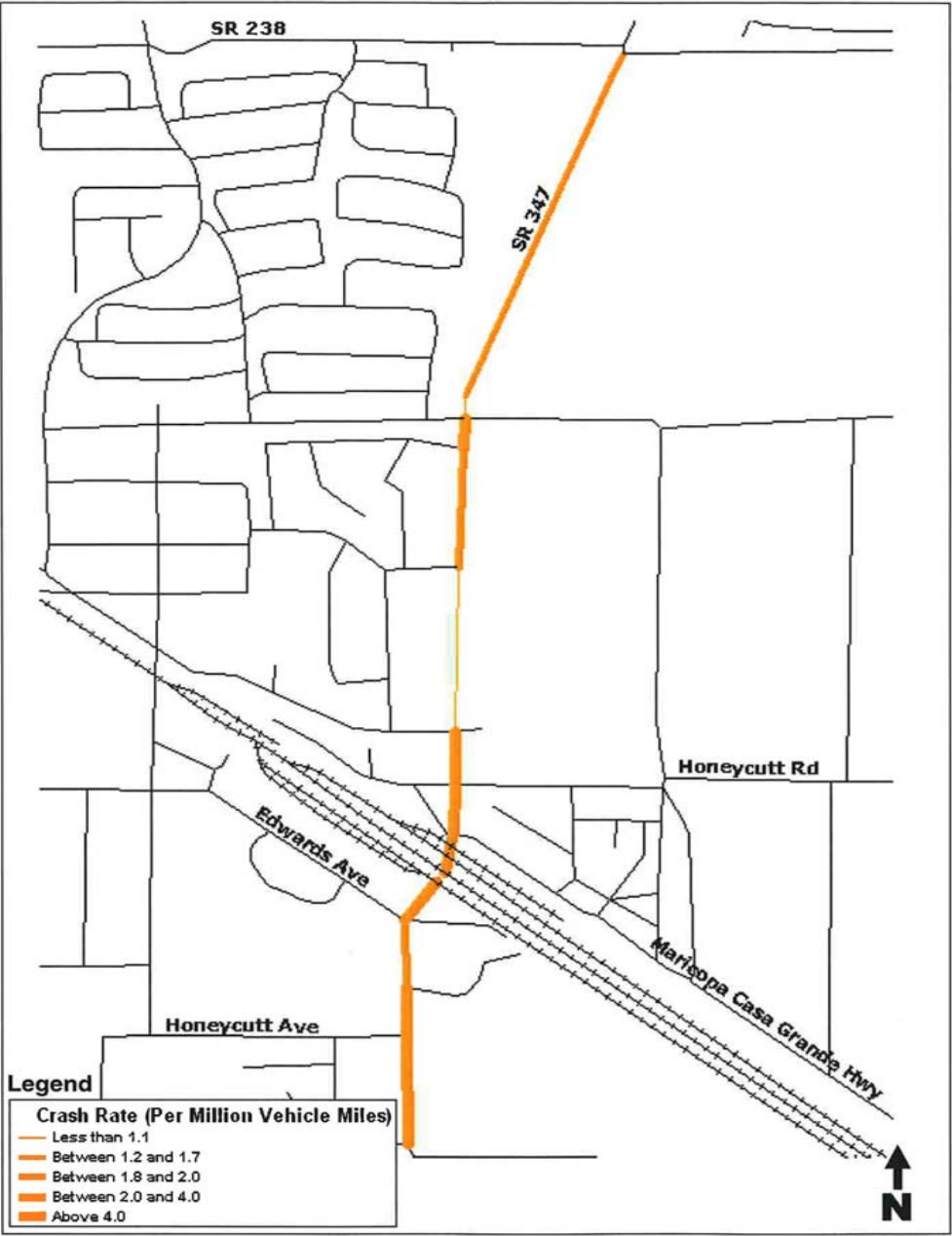


Figure 2-3 Crash Frequency and Rate

Table 2-2 Crash Data Summary ¹										
Intersections/ Segment	Mar 1, 2003- Feb 28, 2004		Mar 1, 2004- Feb 28, 2005		Mar 1, 2005- Feb 28, 2006		Three Years Total			Crash Rate ²
	Injury (Fatal)	Non Injury	Injury (Fatal)	Non Injury	Injury (Fatal)	Non Injury	Injury (Fatal)	Non Injury	Total	
1. SR 347 – Between Smith-Enke Road and Edison Road (0.54 mile) (3)	1 (0)	4	1 (1)	8	2 (0)	7	4 (1)	19	24	2.03
2. SR 347 – Between Edison Road and Maricopa Casa Grande Highway (0.56 mile)	0 (0)	3	1 (0)	4	1 (0)	10	2 (0)	17	19	1.55
3. SR 347 – Between Maricopa Casa Grande Highway and Honeycutt Avenue (0.31 mile)	1 (0)	2	0 (0)	4	1 (1)	12	2 (1)	18	21	4.65
4. SR 347 – Between Honeycutt Avenue and Bowlin Road (0.67 mile)	1 (0)	3	0 (0)	4	1 (0)	5	2 (0)	12	14	1.43
Total	3 (0)	12	2 (1)	20	5 (1)	34	10 (2)	66	78	
<div>1. Crash data analyzed based on data provided by the ADOT TPD from March 2003 to February 2006</div> <div>2. Segment Crash Rate per million vehicle miles (MVM) of travel = (a x 1,000,000)/ (c x ADT x 365 x n) a = Number of reported crashes, ADT = Annual Average Daily Traffic volume c = Length of segment in miles, n = number of years</div> <div>3. Edison Road is the east-west arterial approximately ½ mile north of the UPRR.</div>										
Source: ADOT Traffic Safety Division										

Crash rates on SR 347 were calculated based on daily traffic volumes from years 2003 to 2006 and number of reported crashes. Results showed the crash rate to be 4.65 crashes per million vehicle miles (MVM) of travel between the MCGH and Honeycutt Avenue. Figure 2-3 illustrates the crash frequencies and rates on various of SR 347.

2.3 2020 Traffic Forecasts

Although the design year for the project is 2030, traffic forecasts were developed utilizing the Maricopa SATS 2020 *Ideal Arterial + Regional Connections* as being the best information available and as agreed upon with the City. Additionally, the Pinal County travel demand model (developed after the Maricopa SATS) was obtained and utilized to ensure consistency with regional travel demand, particularly with the estimated amount of ‘through’ travel or trips that begin and end outside the City of Maricopa.

The 2020 *Ideal Arterial + Regional Connections* was reviewed and modified for the following assumptions. These are based on discussions and agreement with the City:

- Eliminated the extensions of White & Parker Road to the north, Smith-Enke Road to the east, and Bowlin Road /Honeycutt Road to the east.
- Revised the “through” traffic volumes based on the Pinal County SATS forecasts.
- Modified network for centroid loadings to allow full access rather than right in/out on all Parkway facilities.
- Updated socioeconomic data provided by the City.
- Modified White & Parker south of the Peters & Nall Road to a two-lane Arterial.
- Made Hiller Road a six-lane Parkway.
- Made SR 347 between Bowlin Road and Hiller Road a six-lane Arterial.
- Made SR 347 south of Bowlin Road and north of Hiller Road a six-lane Parkway.
- Made Maricopa-Casa Grande Highway between SR 347 and White & Parker a six-lane Arterial.
- Made Maricopa-Casa Grande Highway between White & Parker Road and the southeastern model limit a six-lane Parkway.
- Constrained external volumes on SR 347 and White & Parker Road to the south, and on Maricopa-Casa Grande Highway to the southeast, to operate at the model’s roadway capacity.

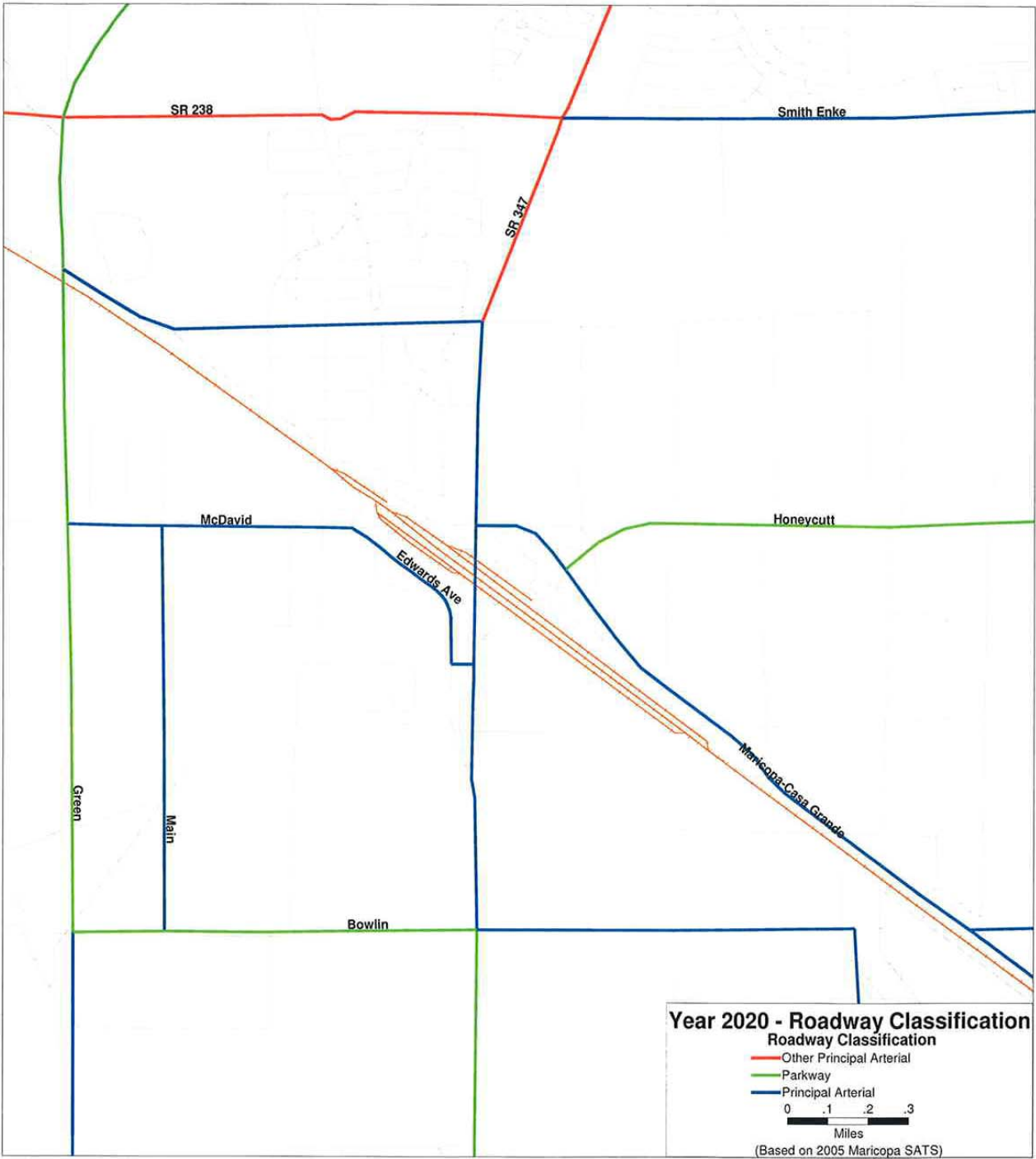


Figure 2 - 4 Future Roadway Classifications

Traffic forecasts for the existing conditions (and “No Build” option) are shown on Figure 2-5

The travel demand model is link (roadway capacity) constrained and not node (intersection capacity) constrained. Subsequently, traffic operations with a bridge crossing versus an at-grade crossing are not reflected in the model. However, the grade separation would significantly improve traffic operations compared with the at-grade intersection, in addition to improving safety by removal of any vehicular/train conflicts.

Traffic forecasts using the updated model were also developed for the five SR 347-UPRR options, and are included in Section 4 of this report. Note that in the traffic (volume/capacity) charts included in that section, it is assumed the SR 347 ultimate build-out will be six lanes for through traffic (three in each direction), even though traffic projections would suggest additional lanes are needed. The six-lane assumption is based in understanding that much development has already occurred along SR 347, and that it would be impractical to assume that additional lanes can be provided. The need for additional roadway capacity in the vicinity of this project will be addressed in the 2007 SATS.

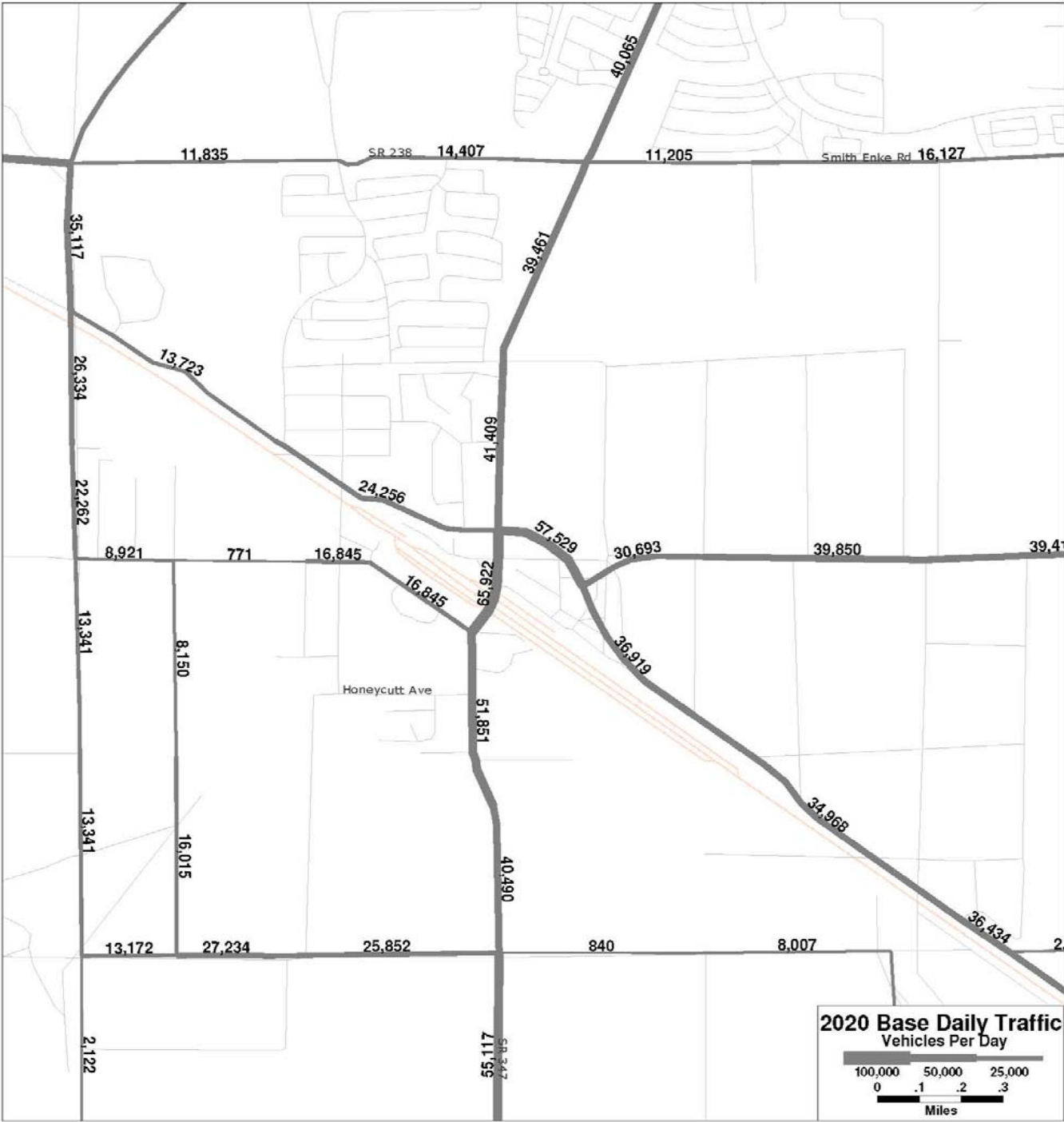


Figure 2 - 5 Future Traffic Projection

3.0 MAJOR DESIGN FEATURES

3.1 Introduction

The SR 347-UPRR grade separation would be a large, complex project that involves improvements to Arizona SR 347 and major modifications to other key roadways in an emerging regional transportation network. All options discussed in this report would include the following improvements:

- Widening (to six through lanes – three in each direction), realignment and profile changes to SR 347.
- Major reconstruction and realignment of other roadways and intersections in the area including Honeycutt Avenue, Edwards Avenue / McDavid Road, the Maricopa-Casa Grande Highway, and Honeycutt Road.
- One or more grade separations with the Union Pacific Railroad, which could be over or under the railroad.
- Major structures, including a roadway bridge over the UPRR, or a railroad bridge over SR 347.
- Major utility relocations.
- Construction of a drainage system, including curb-gutter and catch basins, storm sewers, retention basins, and, if SR 347 depressed under the UPRR, a stormwater pump station.

This section of the report describes the primary criteria and features that have guided the development of the proposed alternatives.

3.2 Roadway Configurations

Please refer to Appendix A - SR 347 UPRR Grade Separation Project – Roadway Design Parameters for a complete description of roadway configurations.

3.3 Design Controls

Please refer to Appendix A - SR 347 UPRR Grade Separation Project – Roadway Design Parameters for a complete description of design controls.

3.4 Access Control

Some control of access is recommended for SR 347 and the other primary roadways in the project area to enhance traffic operations and safety. Also, raising (or lowering) the profile of SR 347 will cut-off existing accesses to some adjacent properties; access to these properties will be maintained to the extent practical. Access control will generally be provided by the use of vertical curb.

3.5 Right-of-Way

Roadway / Railroad Rights-of-Way: Existing roadway / railroad rights-of-way, and other key public property ownership in the project area include the following:

SR 347:

- South of the UPRR: typically 100’ wide.
- Across the UPRR right-of-way: 100’ wide easement, centered about the existing roadway centerline.

- North of the UPRR: varies from 80’ to approximately 125’ wide.

Honeycutt Avenue: 60’ wide, at its intersection with SR 347.

Edwards Avenue: 80’ wide, at its intersection with SR 347.

Union Pacific Railroad: 375’ feet total right-of-way width, including 100’ south and 275’ north of the existing track.

Maricopa-Casa Grande Highway: 66’ wide, near its existing intersection with SR 347.

Honeycutt Road: 66’ wide, at its existing intersection with SR 347.

Garvey Avenue: 80’ wide, at its existing intersection with SR 347.

3.6 Other property ownership within the project area

Maricopa Schools controls the property on the northwest corner of SR 347 and Honeycutt Avenue. This property is being used by the school district for elementary, middle and high school activities.

The Amtrak station, and other private operations immediately north of the UPRR tracks, for example the U-Haul operation, are wholly within the Union Pacific Railroad right-of-way by lease or permit.

The Pinal County / Maricopa Fire District complex immediately across from Garvey Avenue is Pinal County property.

Essentially all other property within the project area is privately owned.

3.7 Drainage

3.7.1 Existing Conditions / Features

The SR 347-UPRR intersection in the City of Maricopa is a flat area with few significant drainage features. Due to flatness of the area, runoff from impervious areas, such as streets, tends to pond, and some localized street flooding does occur. The project area is not in or near any recognized FEMA floodplain. One apparent area with a history of localized flooding is near the intersection of SR 347 and Honeycutt Avenue. Offsite drainage is not typically an issue in the project area, as it drains toward agricultural fields or undeveloped lots. Runoff in newer residential areas is generally retained onsite.

Drainage on SR 347 within the project area was addressed when the roadway was upgraded to a five-lane section in the early 1990’s. At that time, some areas of SR 347 were curbed, and runoff in those areas was collected and routed to retention basins, which were constructed as part of the project.

Along SR 347, the UPRR acts as a drainage divide, and runoff that is collected north of the tracks is routed north approximately 1200’ to a basin along the east side of SR 347, immediately north of the Pinal County / City of Maricopa complex.

South of the UPRR, SR 347 runoff is collected and routed to Edwards Avenue, and conveyed west via 1200’ of pipe to an open channel and drainage ditch alongside the UPRR.

3.7.2 Proposed improvements

It is anticipated that drainage for the proposed SR 347-UPRR Grade Separation project will be handled consistent with the current drainage scheme. Pavement runoff will be collected by curb-gutter and catch basins, and conveyed to the existing off-site retention areas north and west of the project. The capacity of these retention areas may need to be upsized to accommodate increased runoff from wider paved areas, including the major streets to be upgraded by the project. Remnant right-of-way parcels may also be used for retention areas. If necessary, right-of-way may be purchased for retention.

Should it be decided to depress SR 347 under the UPRR, a stormwater pumping station would be required to keep the depressed roadway area from flooding. These types of pumping stations, although undesirable because of their long-term operations and maintenance costs, are not unusual on ADOT facilities. Stormwater pumped from a depressed roadway section would likely be conveyed to a retention area.

No significant off-site runoff is anticipated to enter the project area. Addressing localized flooding areas in the project area, such as the problem area near the intersection of SR 347 and Honeycutt Avenue, should be evaluated as part of the final project scope.

3.8 Structures Considerations

The grade separation alternative analysis for the SR 347-UPRR project must consider both structural evaluation criteria and corridor constraints to determine the most cost effective and efficient solution to separate the two facilities. Preliminary bridge layout, span arrangement and structure type were evaluated to the level necessary to accommodate the following criteria and constraints:

Design Codes - Highway structures (SR 347 over UPRR) will be designed using the AASHTO design codes as amended by the *Arizona Department of Transportation (ADOT) Bridge Practice Guidelines*. Based on project schedule, it is anticipated the structures will be designed using *AASHTO LRFD Bridge Design Specifications, 3rd Edition 2004* with current interims (or the current edition accepted by ADOT Bridge Group) as amended by the *ADOT Bridge Practice Guidelines for LRFD*. Railroad structures and structures over the railroad (SR 347 under UPRR) will be designed using Union Pacific Railroad Company’s *Guidelines for Design and Construction of Grade Separation Underpass Structures*, 1998 and the *Manual for Railway Engineering*, 2004, published by the American Railway Engineering and Maintenance-of-Way Association (AREMA).

Compatibility with Existing/Proposed Facilities - The major consideration that frames all project options is where and how to achieve a grade separation between the primary north-south roadway (SR 347) and the UPRR tracks. The purpose of the structure is to convey SR 347 traffic over or under the UPRR and eliminate the long traffic delays caused by the existing at-grade crossing. The bridge must accommodate the future SR 347 typical section that is classified as a principal arterial facility with six lanes, as shown in Appendix C. In addition to carrying three lanes in each direction, the bridge must accommodate bicycles and pedestrian traffic, and should accommodate “signature street” aesthetics, as indicated by the City of Maricopa General Plan. In the existing condition, UPRR has a mainline and a passing track at the site. The UPRR has indicated a proposed future mainline track to the south of the existing track (at 20’ center-to-center minimum spacing). UPRR has also indicated a third mainline track is being considered, but the location is not known at this time. Therefore, for the ultimate condition, the structure must accommodate three mainline tracks and two maintenance roads on the outside of the three tracks.

Feasibility/Constructability – The grade separation structure construction must occur while maintaining traffic on both SR 347 and the UPRR. All of the proposed roadway options shift SR 347 away from the existing

alignment sufficiently to allow full-width structure construction to occur while maintaining traffic on existing SR 347. Preliminary bridge layout considered spanning the entire UPRR right-of-way for the SR 347 over UPRR option. This results in span lengths in the range of approximately 110 feet which are well within the range of pre-stressed concrete I-girders. I-girder construction is a preferred structure type of ADOT and affords the most cost effective means of spanning the UPRR with the least amount of disruption to track operations. The most feasible SR 347 under UPRR option would require a dual track shoofly to maintain rail service during construction of the structure. Preliminary bridge layout for the under option considered spans in the 70’ - 100’ range for material flexibility to meet UPRR preferences.

UPRR Preferences - The following is a list of underpass structures preferred by the UPRR in priority order from the *Guidelines for Design Construction of Grade Separation Underpass Structures, 1998*. The UPRR requires selection of the most preferred alternative, unless there are compelling reasons to choose a less preferred structure type.

- 1. Steel plate girders with cast-in-place concrete deck
- 2. Steel rolled beams with cast-in-place concrete deck
- 3. Prestressed concrete box girders single or double cell
- 4. Prestressed concrete AASHTO type girders with cast-in-place concrete deck
- 5. Cast-in-place concrete box girder with conventional reinforcing
- 6. Post-tensioned concrete box girders
- 7. Through type simple supported steel girder spans with concrete or steel deck
- 8. Grade separation underpass structures of deck or through truss design

Other Structures – Roadway Options 1 through 4 introduce other structures in addition to the main SR 347/UPRR grade separation structure. They generally fall into two categories: (1) an extension of the main structure and (2) new UPRR crossings. Options 1 and 4 require an extension of the main structure. For the SR 347 over UPRR structure, girder construction lends itself well to considering additional spans to accommodate other roadways that pass under the bridge. For the SR 347 under UPRR structure, for Option 1 consideration should be given to continuing the sag vertical curve for a sufficient length to pass under the MCGH and placing the MCGH on its own structure. Options 2, 3 and 4 require additional crossings of the UPRR. Consideration should be given to the same type of structures as proposed for the over and under options. Some of the roadway options show phasing opportunities that include additional UPRR crossings. If the under options are selected for development, the concept of constructing all the crossings at once should be considered, in order to take advantage of the relocated railroad.

Bridge Aesthetics – The project lies within the Old Town Redevelopment Area as defined in the City of Maricopa’s *2006 General Plan*. The center of this area is SR 347, or the John Wayne Parkway as it is known within the limits of the City of Maricopa. John Wayne Parkway is described as a signature street with an adjacent trail system. Economically appropriate aesthetic enhancement of the overpass/underpass structures should be incorporated into the design. Several ways of accomplishing this include (1) concrete surface treatment in the form of color, texture or formliner, (2) aesthetic lighting and/or special poles and fixtures, (3) enhanced pedestrian areas on the bridge, (4) adjusting the structure length to create open space under the bridge and (5) incorporation of public art.



Bridge aesthetic opportunities would include enhanced pedestrian areas, specialized rustication, and architectural features

Pedestrians/Trail System – The 2006 *General Plan* proposes a trail along the John Wayne Parkway south of the UPRR that has its trailhead near the at-grade crossing of SR 347-UPRR. A trail connection is also shown north of and parallel to the railroad tracks. Coordination is required with City of Maricopa Parks, Recreation and Libraries Committee on the location and definition of the trails/trailhead. The goal is to integrate the trail system within the project to provide safe connectivity of the trail system across the UPRR facilities.

3.9 Geotechnical

Following is an overview of geotechnical conditions at the project site. For a more detailed discussion of geotechnical findings and recommendations, see Appendix E of this report.

Geotechnical Profile - The geotechnical profile at the grade separation site is comprised of sedimentary soil deposits within a broad alluvial plain. Site soil units consist of stratified mixtures of sand, clay and silt variously described as silty to clayey sands, sandy clays, and sands. Hard, strongly cemented soils may be encountered as shallow as ten or 15’ below ground surface. A somewhat softer (moderately firm to firm) stratum consisting of clayey to silty sand was encountered in areas of the site at a depth of about 25’-30’ below existing grades. Cobbles and occasional small boulders are not anticipated to be encountered at the site, except in confined washes and drainages.

Groundwater & Soil Moisture Conditions - The site soils generally are described as slightly moist to moist, with measured soil moisture contents typically in the range of about 1 – 10% (dry weight basis), with occasional higher values for more clayey soils. No free groundwater was encountered in borings reviewed for this study, to a depth of investigation of about 30’. The depth to groundwater in the site area is estimated to be in the range of 90’-120’ below the existing ground surface.

Moisture-Sensitive Soils - Zones of near-surface soils in the site region possess potential for collapse upon wetting. Delineation of the depth, extent and characteristics, and required treatment of potentially collapsible soils will be necessary during design.

Earth Fissures - In response to long-term groundwater pumping and withdrawal, earth fissures and potential earth fissures have been identified in the Maricopa area since the late 1980s. Published investigations indicate possible earth fissures about five to six miles west of the project site, north and south of SR 238 near and east of Hidden Valley Road. Earth fissures are not expected within this project site; however, investigation of the presence of any earth fissures at the project site should be completed during design.

Roadway Subgrade Conditions - Due to the softness of surface soils, pre-wetting and compaction, overexcavation and replacement, or alternative treatment may be required beneath proposed roadways and embankments. Embankment fills should be founded on recompacted near-surface soils or on firm, cemented soils at relatively shallow depth. An earthwork factor of 15% shrink should be anticipated for project excavation and backfill. Site soils are anticipated to be excavatable with conventional equipment, with the exception of isolated zones of caliche. Available borrow from project excavations in the site area will be suitable for use as embankment fill, but will be unsuitable for use as structure backfill.

Foundation Conditions - The firm to hard, weakly to moderately cemented soils at relatively shallow to moderate depths at the site will provide good support for both deep foundations (drilled shafts) and spread footings. For the elevated SR 347 alternative, it is recommended that bridge structure loads be supported on deep foundations (drilled shafts). Use of surface casing and possibly slurry-assisted procedures may be required to maintain shaft excavations. Alternatively, spread footings founded at shallow to moderate depths (at least 5’-10’ below existing grades) on the cemented soils could be utilized for support of bridge substructures and retaining walls.

For elevated approaches, conventional cast-in-place or MSE-type retaining walls should be supported on spread footings which bear on weakly cemented soils at a depth of about five feet or greater below grade. Shallow spread footings should be avoided. For the depressed crossing alternatives, drilled shafts or spread footings are recommended for support of the railroad bridge structure and retaining walls. Excessive settlement of structures which bear on the more cemented soils is not anticipated.

Below-Grade Walls & Temporary Shoring - Below-grade walls for the depressed roadway can be constructed by various means, including soil nail, soldier pile and tieback, or conventional cast-in-place walls on spread footings or possibly drilled shafts. Use of a “top-down” construction method will eliminate the need for excavation and backfill behind the walls. Subsurface soil conditions at the site generally appear to be well-suited for top-down wall construction.

Retention Basins - Because of the relatively fine-grained and generally cemented nature of the site soils, percolation rates in retention basins are anticipated to be relatively low. Retention basin design should be supported by field percolation testing at planned bottom-of-basin elevation.

3.10 Utilities

In general, public and private utilities are present within the project area consistent with the area’s general development: water, sewer, power, telephone and fiber optic lines necessary for a small commercial / residential area. In addition, significant utilities lie within the UPRR right-of-way. More specific information on the type and location of utilities in the area include:

Water and sewer:

- Water / sanitary sewer distribution lines, typically 4 – 12 inches in diameter, are located within SR 347, Honeycutt Road, and the Maricopa-Casa Grande Highway. Owners include Global Water and Maricopa Domestic.
- An 8 inch waterline located under SR 347 approximately 5.5 feet beneath the UPRR rail line.
- Collector sewer lines are located in the residential streets in the project area.

Petroleum products:

- Two (2) petroleum product lines are located within the UPRR right-of-way parallel to the railroad tracks typically buried 5 feet under SR 347 and 4 feet elsewhere.

- An idle (or abandoned) 8-inch line north of railroad.
- An active 12-inch line (inside a 20-inch casing) 85 – 115 feet south of railroad track, operated by Kinder-Morgan.
- An agreement exists regarding possible relocation of the Kinder-Morgan pipeline. This agreement should be reviewed as part of this project.

Natural gas:

- Natural gas lines (owned and operated by Southwest Gas) run along major roads (i.e. SR 347, Honeycutt Road, etc) in the project area. Those that pass under the railroad are typically buried 5 feet beneath the tracks.

Fiber optic and Cable TV:

- Qwest fiber optic runs south of UPRR in SR 347.
- IXC also has fiber optic in the area.

Level 3 Communications, Orbitel and Maricopa Broadband have indicated they do not have fiber optic in the area.

3.11 Union Pacific Railroad

3.11.1 Existing Facilities

The Union Pacific Railroad’s “Sunset” line crosses SR 347 at Milepost 173.4. As one of UPRR’s few trans-continental lines, the Sunset Line is critical to Union Pacific’s nationwide operations. Currently over 60 trains per day traverse this line.

A siding track is located immediately west of the SR 347 intersection. This siding extends to the west, and is used as a waiting area for freight trains awaiting another train from the opposite direction to clear.

3.11.2 Planned Facilities

The UPRR is planning to add a second line in the vicinity of the SR 347 crossing within the next two years. This second line will be located 20 feet south of the existing line. The siding west of SR 347 will also be relocated and will remain in service.

In discussions regarding this project, UPRR officials have asked that grade separation crossing(s) be designed to accommodate a possible third set of tracks. The timing and location (north or south of the existing line) of this third line is unknown; the UPRR will advise of a position for the future third track in time for design of the grade separation to proceed.

In addition to the second and third rail lines, the UPRR will require that space be provided under any SR 347 overpass (or on any UPRR overpass) for one or two maintenance roads. Two roads will be provided for the SR 347 over the railroad option; one will be provided if the road is depressed below the railroad.

3.11.3 Design Requirements

Roadway and railway arrangements, including spacing between tracks and maintenance roads, and horizontal and vertical clearances, are accurately depicted on the drawings in Appendix C.

Design of UPRR structures (SR 347 under UPRR) must conform to Union Pacific Railroad Company's *Guidelines for Design and Construction of Grade Separation Underpass Structures*, 1998 and the *Manual for Railway Engineering*, 2004, published by the American Railway Engineering and Maintenance-of-Way Association (AREMA).

All detailed design of structures and other improvements within the UPRR right-of-way must be reviewed and approved by UPRR personnel.

3.11.4 SR 347 Over/Under UPRR

The proposed grade separation structure is the main component of the project and is the top priority identified by the City and ADOT. The grade separation determination works closely with the roadway alternatives analysis. The structural criteria and corridor constraints described in this report are the base elements of the evaluation. In order to determine the most cost effective option for crossing the railroad, both overpass and underpass alternatives are discussed for SR 347. A comprehensive discussion and comparison of the over and under alternatives for the grade separation is included in Section 4.

3.12 Amtrak

3.12.1 Existing Facilities

Amtrak's Maricopa Station is located at the northeast corner of SR 347 and the Union Pacific Railroad. The station includes a modular administrative building, parking lot, loading platform adjacent to the UPRR tracks, and a preserved Amtrak passenger car. The station is located wholly on UPRR right-of-way under a lease (or permit) arrangement.

Currently six trains per week stop at the station, and there are no significant plans to upgrade or modify the facility.

3.12.2 Design Requirements

In discussions, representatives from both Amtrak and the UPRR have indicated that the Amtrak Station can be relocated if necessary. Relocation of the loading platform has also been suggested as an interim measure to relieve some of the SR 347 congestion, as Amtrak trains stopped to load and unload passengers frequently block the roadway for several minutes.

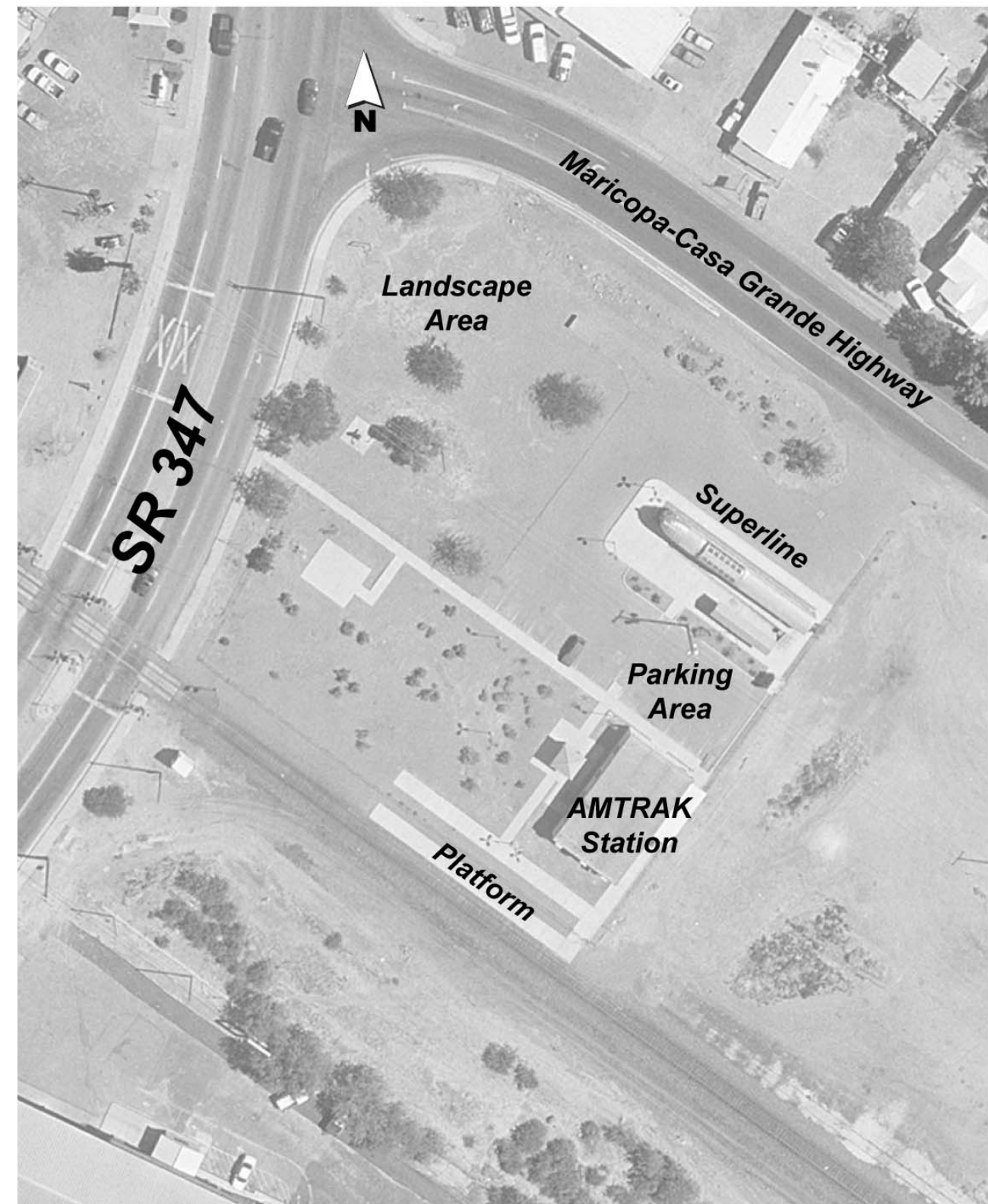


Figure 3-1 Aerial photo of Amtrak Maricopa Station

3.13 City of Maricopa General Plan Elements in Project Area

The City of Maricopa was incorporated in 2003, and adopted their first General Plan in early 2006. The General Plan addresses all aspects of development within the City, with the intent to guide planning and construction to be consistent with the long-range vision for the community

Transportation and community amenities are two critical elements in the City’s General Plan, and they intersect within the SR347-UPRR Grade Separation project area. Following are details of how those elements might interplay with further development of this grade separation project.

3.13.1 Old Town Redevelopment Area

Figure 3-2 shows the location of the “Old Town Redevelopment Area”. This area covers the community’s traditional commercial center, and extends from northwest of the SR 347-UPRR intersection to southeast of it. By identifying this area in the General Plan, the City has designated the area for special treatment to preserve and enhance the traditional city center.

Construction of a grade separation facility within this redevelopment area could have a profound impact on how the area gets developed. The area is already bisected by the SR 347 intersections with the MCGH and Honeycutt Road. Upgrading the roadways in this area may affect access to redeveloped areas. Also, a raised roadway / grade separation would present a significant visual feature in the area. These apparent negatives could be changed to positives with appropriate planning, i.e. for providing good access, aesthetic treatments, etc. Also, the grade separation would be located at the south end of the existing commercial area, and impacts may be negligible if the focus of the redevelopment is to the north.

3.13.2 John Wayne Parkway Signature Street

SR 347, also known as John Wayne Parkway within the limits of the City of Maricopa, being one of the city’s main thoroughfares, is designated to receive special treatment in the city’s General Plan, that is to become a “signature street”. Specifics for signature streets are not included in the General Plan. However, these typically include special visual and community amenities – wide medians and sidewalks, bicycle lanes, special landscaping, and possibly community art. All of the options presented for the SR 347-UPRR grade separation could be adapted to receive signature street treatments.

3.13.3 Trails / Paths

In addition to being at the cross-roads of key roadways, the SR347-UPRR grade separation project is in the middle of the City’s proposed trail and trailhead system. The 2006 General Plan proposes two trails and a trailhead to be located in the immediate vicinity of the SR 347-UPRR intersection. (See Figure 3-3).

Trails, as well as pedestrian and bicycle facilities are frequently integrated into major roadway construction projects. Appropriate facilities for bikes and pedestrians, or space for future facilities, should be incorporated into the design of the project as it proceeds.

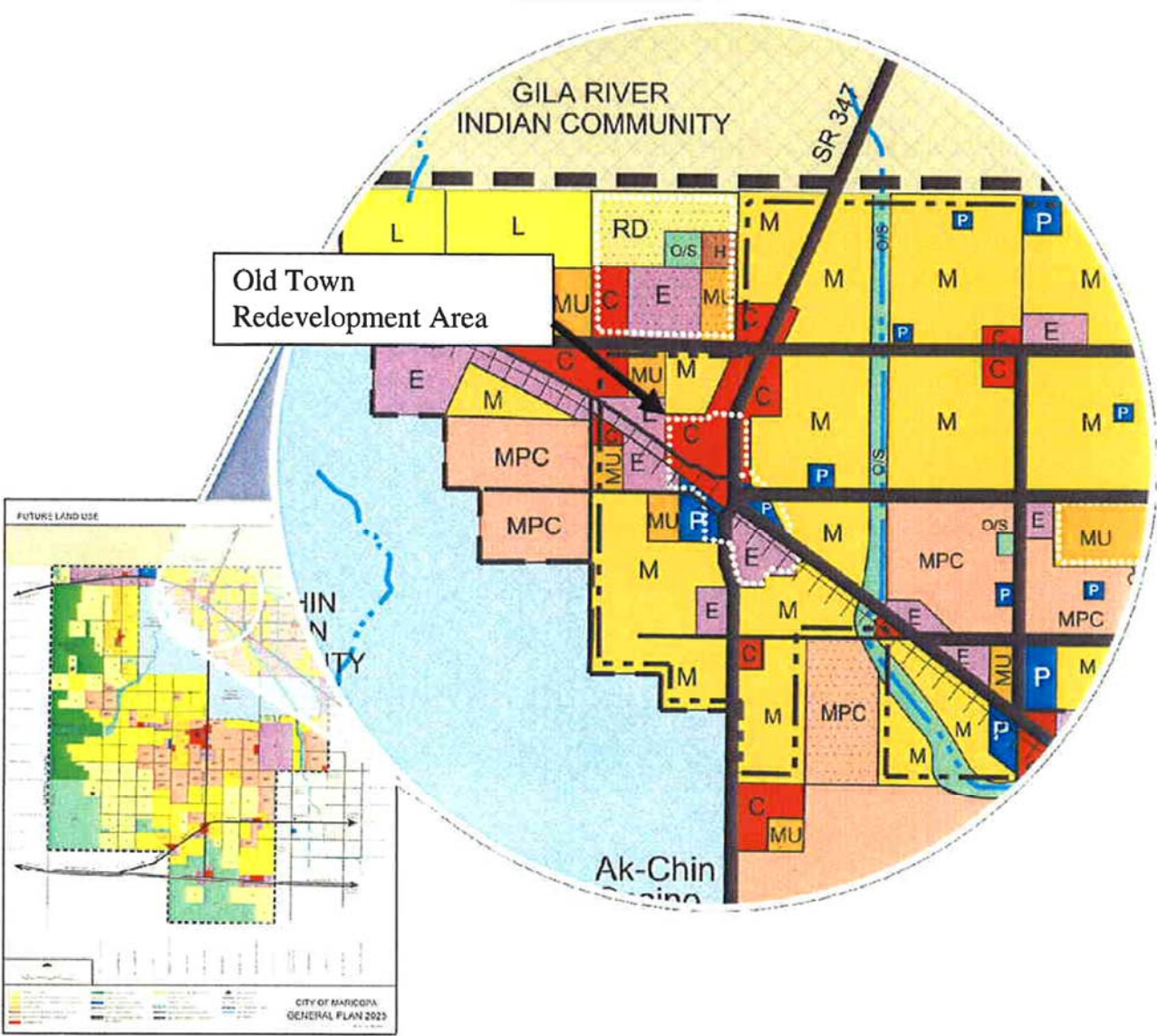


Figure 3-2 Excerpt from General Plan showing Old Town Redevelopment Area

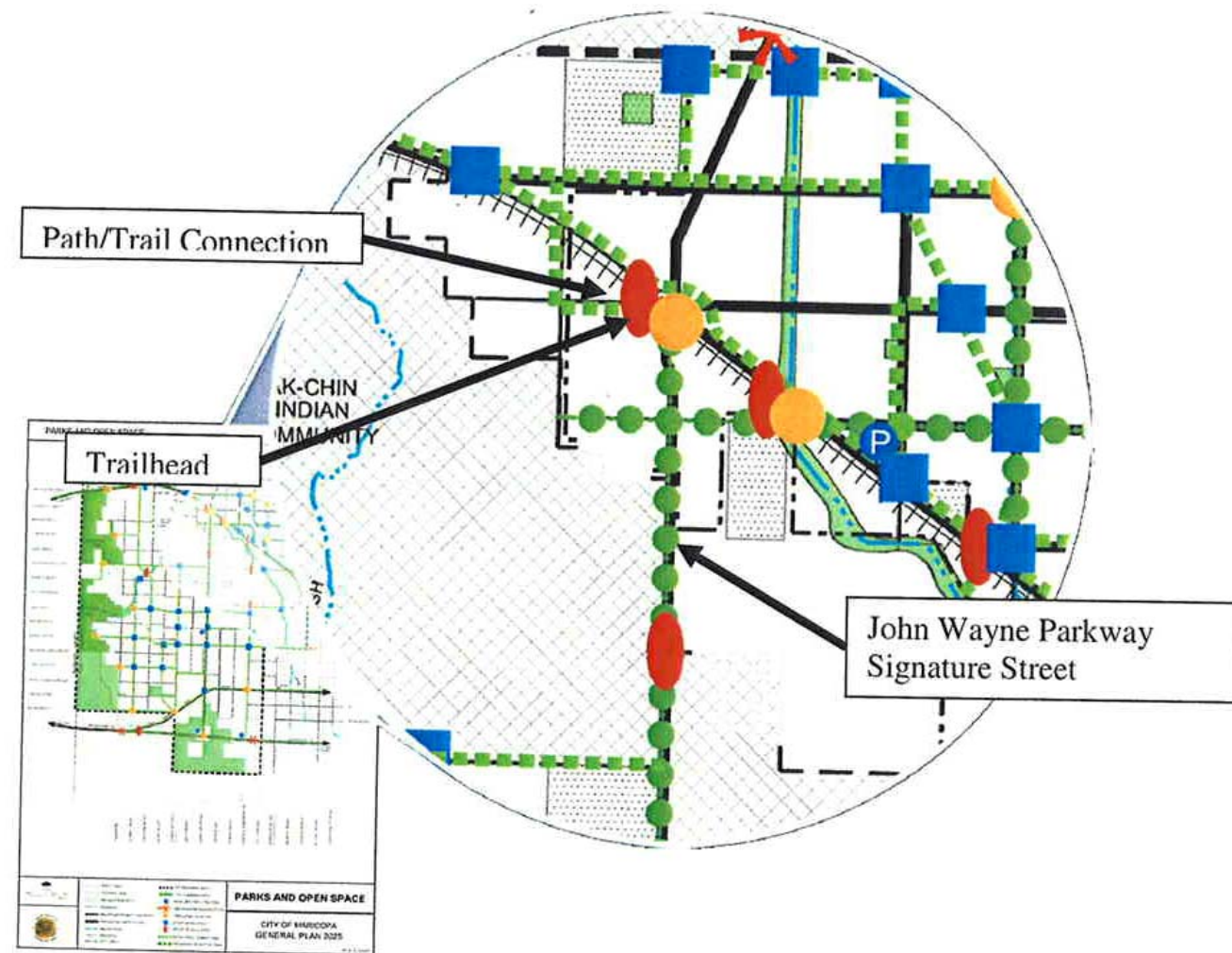


Figure 3-3 Excerpt from General Plan showing Community Features in Project Area

3.14 Constructability and Traffic Control

Constructability and maintaining traffic during construction will be important challenges to be addressed during final design and construction. Key considerations include the following:

- SR 347 and the Maricopa-Casa Grande Highway are critical arterial roadways serving fast-growing subdivisions south and southeast of the project area. Two-way traffic must be maintained at all times, and two-lanes in each direction should be maintained on SR 347 during daylight and peak hours.
- As a result of the need to keep SR 347 open to traffic during construction, it is likely that its final alignment will be offset from the existing roadway at least enough to maintain operations until at least two lanes can be opened on the new facility.
- The UPRR overpass / underpass must be designed and constructed to not interrupt railroad operations. This will at least partially drive the selection of the bridge type, and may involve strong restrictions on contractor operations within UPRR right-of-way.
- The SR 347 corridor is an important route for school children, and maintaining pedestrian access is critical.

4.0 ALTERNATIVES EVALUATED

4.1 Introduction

Major objectives of this study include grade separating the SR 347 - UPRR intersection, and upgrading SR 347 and other area roadways to increase capacity and address growing operational problems. These other key roadways include especially the Maricopa-Casa Grande Highway (MCGH) and Honeycutt Road. This section of the Feasibility Report discusses the design goals and considerations, and introduces and evaluates the five project options which were selected for detailed analysis.

4.2 Key Design Goals

The design challenges and goals of this SR 347-UPRR Grade Separation project evolved during the initial phases of the study, especially as projections of future traffic volumes became available. Specifically, it became apparent that this grade separation project would become a catalyst for determining future area and regional traffic needs, as well as serving as a big part of the solution. The “initial” and “added” goals of the project are described below.

Initial Project Goals: The following goals were identified at the study outset:

- Provide a grade separation between SR 347 and the UPRR – to eliminate traffic delays and safety issues associated with the existing, at-grade crossing.
- Upgrade SR 347 cross-section to its ultimate configuration – including 6 lanes (3 in each direction) plus median improvements, turning lanes, bicycle lanes, and sidewalks.
- Maintain or upgrade connections with other key roadways in the area, including Honeycutt Avenue, Edwards Avenue / McDavid Road, the MCGH, Honeycutt Road, and Garvey Avenue.
- Provide or accommodate City-proposed community improvements planned for the area, as described in the City’s General Plan, including John Wayne Parkway Signature Street, the “Old Town” Redevelopment Area, trails and paths, and a trailhead.

The idea of depressing SR 347 under the UPRR was also discussed during project development. Although this was identified as having benefits to the community (decreased noise and visual impacts), it was not accepted as a primary goal for the project. A discussion on the “over vs. under” options is included in Section 4-9 of this report.

Added Project Goals: The need to develop the project to be consistent with future regional transportation improvements, including the following, became apparent during the planning of the grade separation:

- Major improvement of the MCGH to serve as a major east-west facility.
- Major improvement and upgrading of Honeycutt Road, to serve as a possible parkway-type facility to the east.
- A proposed new parkway / freeway corridor along the west side of the City, approximately one mile west of SR 347.
- Other possible future parkway/freeway facilities, including north-south corridors to the east of SR 347.

The area / regional network issues bear directly on determining the optimum solution for the SR 347-UPRR Grade Separation Project. In particular, the connections with Honeycutt Road and the MCGH, with possible ties to a new north-south facility to the west, needed to consider major increases in anticipated traffic. In addition, since SR 347 is the primary north-south link between the City of Maricopa and the Ak-Chin Indian Community with the Phoenix-metropolitan area, modifications to SR 347 need to be carefully evaluated.

As a result of these additional project goals, it became apparent that it would be prudent – and in keeping with National Environmental Protection Act (NEPA) policy – to clarify the area / regional roadway network issues prior to selecting the optimum options for the grade separation project. Specifically, there is a need for better clarification of the city and regional transportation plan, including the future treatment of MCGH and other regional facilities being considered in the City of Maricopa area. Studies are underway or planned, including an update of the City of Maricopa Small Area Transportation Study (SATS) which will answer these questions.

4.3 Alternatives Selection Process

Following is a summary of the steps taken to determine the five options which were selected for further study in this report.

Perform Traffic Analysis: The traffic analysis included review of the current City of Maricopa SATS and other regional traffic forecasting models, as well as review of recent traffic counts on SR 347. See Section 2 TRAFFIC AND ACCIDENT DATA for more information and the results of the study.

Conduct Agency Scoping Meeting: A meeting with all public agencies potentially impacted or having interest in the grade separation project was held June 7, 2006. Participants included representatives from the City, ADOT (Predesign, Tucson District, and Environmental Planning), the Federal Highway Administration (FHWA), Amtrak, Arizona Department of Public Safety, and local and county emergency services. Input from the Agency Scoping Meeting is discussed in Section 2, and the meeting notes are included in Appendix F.

Conduct Meetings with the Union Pacific Railroad: Meetings with the UPRR have been held as part of ADOT Utility and Railroad Section’s monthly meetings with Jim Smith of the UPRR. Results of these meetings are summarized in Section 3 of this report, and are reflected in the designs and cost estimates presented in this report.

Conduct Public Meetings: Two public meetings were held at Maricopa Schools facilities, on June 28 and October 25, 2006. Meetings were also held with the Ak-Chin Community on June 28, 2006 and January 31, 2007. The purpose of these meetings was to 1) get public input on goals and concerns for the project, and 2) to introduce the public to the options proposed for further study. The results of the public meetings are summarized in Section 5 and included in detail in Appendix F.

Compile Other Project Information: As-built and agency information on utilities, drainage, community planning, and right-of-way in the study area was collected for use in developing and evaluating preliminary alternatives.

Develop Preliminary Alternatives: Over 25 preliminary alternatives were developed in the initial stages of the study for consideration and screening. The alternatives were developed to respond to the project goals described earlier in this section.

Conduct Concepts Workshop: In order to present and get input from project team members on the preliminary alternatives, a “Concepts Workshop” was held July 14, 2006 at the City. Participants in the workshop included representatives from the City of Maricopa, ADOT (Predesign, Tucson District, and Environmental Planning), and FHWA. The agenda for the meeting included the following items:

- Introduce team to project setting, including brief reviews of information on traffic, drainage, Union Pacific Railroad requirements, geotechnical conditions, community planning, environmental setting, and utilities.
- Present and introduce the preliminary alternatives.
- Open discussion on the alternatives
- Vote on favorite alternatives

Over 20 concepts were introduced and discussed during this meeting; these are included in Appendix D.

Concept Refinement / Screening: Seven alternatives were identified during the concepts workshop for further consideration. These seven were reduced to five during later meetings involving the City, ADOT and FHWA. Those five alternatives (Options) are presented and evaluated in this report.

In addition to the five geometric layouts that have been developed, the option of taking SR 347 under the UPRR (versus the more common alternative of going over the railroad) is also presented and evaluated in this report.

Draft Feasibility Report: This report presents the findings and recommendations of the above described process. Summary descriptions, layouts and cost information for each of the five options are included in this section of the report. The “No Build” option is also discussed. For more specific design information on the five options refer to the Appendices.

No Build Alternative: The no build alternative was evaluated for the selected criteria and the results are summarized in the following list:

- Capacity improvements on SR 347 would not be implemented.
- Delays and congestion on SR 347 resulting from traffic stopped for UPRR and Amtrak trains would intensify.
- Delays and congestion on other area roads, including regional arterials MCGH and Honeycutt Road, would intensify.
- Increased congestion would have negative impacts on quality of life, and further economic development in the project area.
- Improved bicycle and pedestrian facilities, including paths and a trailhead, would be difficult to implement.
- No right-of-way would be required, resulting in no impacts to adjacent businesses.

The project objectives discussed in Section 1 would not be achieved; therefore, we recommend that the no build alternative be discontinued from further development.

Introduction to Options:

Layouts, descriptions, analyses and cost estimates for five alternatives for providing the SR 347 – UPRR grade separation follow. Please note the following regarding the information contained in these sections:

Note 1 – regarding graphics:

The proposed roadways shown in the Option graphics are schematic only and generally do not reflect an accurate alignment of SR 347 or the extent of impacts of the project. SR 347 would typically be offset from its current alignment to improve constructability and maintenance of traffic, and the area of disturbance resulting from SR 347 fully elevated over the railroad could be 200 feet wide or more.

Note 2 – regarding graphics:

The traffic (volume over capacity) graphics in this section are schematic and do not accurately show the current or future rail lines in the vicinity of SR 347. The rail lines at this location include one thru line and a siding west of SR 347; a second thru line is to be added within the next two years.

4.4 Option 1 – “MCGH Under SR 347”

4.4.1 General Description

Primary Goals of Option 1:

- Provide high-capacity connection between SR 347 and the MCGH.
- Take advantage of the elevated section of SR 347 north of the UPRR, to maintain flow on the MCGH while keeping it away from the congested area between UPRR and Honeycutt Road.
- Keep the SR347-MCGH intersection separated from other intersections in the area.
- Maintain other key SR 347 connections, including Honeycutt Road to MCGH and Honeycutt Avenue.

Main Features of Option 1:

- SR 347 is elevated over the UPRR and CMGH alignments.
- MCGH is routed under an elevated SR 347, continues along its current alignment parallel to the UPRR west for approximately one-quarter mile where it turns north and, ultimately, back east to connect with SR 347 at a new tee intersection a little more than one-half mile north of the UPRR.
- Honeycutt Road is tied into MCGH by a tee intersection.
- A new connection between MCGH and SR 347 is provided approximately one-eighth mile west of SR347 to provide access between MCGH and SR 347 to the south.
- South of the UPRR, SR 347 is straightened and realigned to the east, and an improved connection is provided with Honeycutt Avenue.

4.4.2 Option 1 Costs*

Option 1 Cost Summary	
Construction (including Const. Admin)	\$58.0 million
Engineering	\$5.7 million
Right-of-Way Acquisition (\$500,000 / acre)	\$18.7 million
Total Option 1 Cost	\$82.4 million

*Note regarding cost estimates: It is anticipated that the costs of this project will be shared amongst ADOT, the City of Maricopa and other parties. No effort has been made at this time to determine how the costs will be shared. ADOT policy typically limits ADOT funds to be spent only on ADOT facilities, in this case including only SR 347. Limits are typically to the back of curb returns for reconstruction of intersections with local streets, plus any reconstruction needed to make the current intersection work, e.g. reconstruction to make profiles match.

4.4.3 Possible Refinements for Option 1

- Honeycutt Road connection with MCGH could be moved east to reduce impacts to neighborhood north of Amtrak station.
- SR347 south of UPRR could be aligned further east or west, to reduce costs and / or improve intersection operations.
- Maintain Honeycutt Road on existing alignment and improve its existing intersection with SR 347.

4.4.4 Option 1 – Advantages and Disadvantages

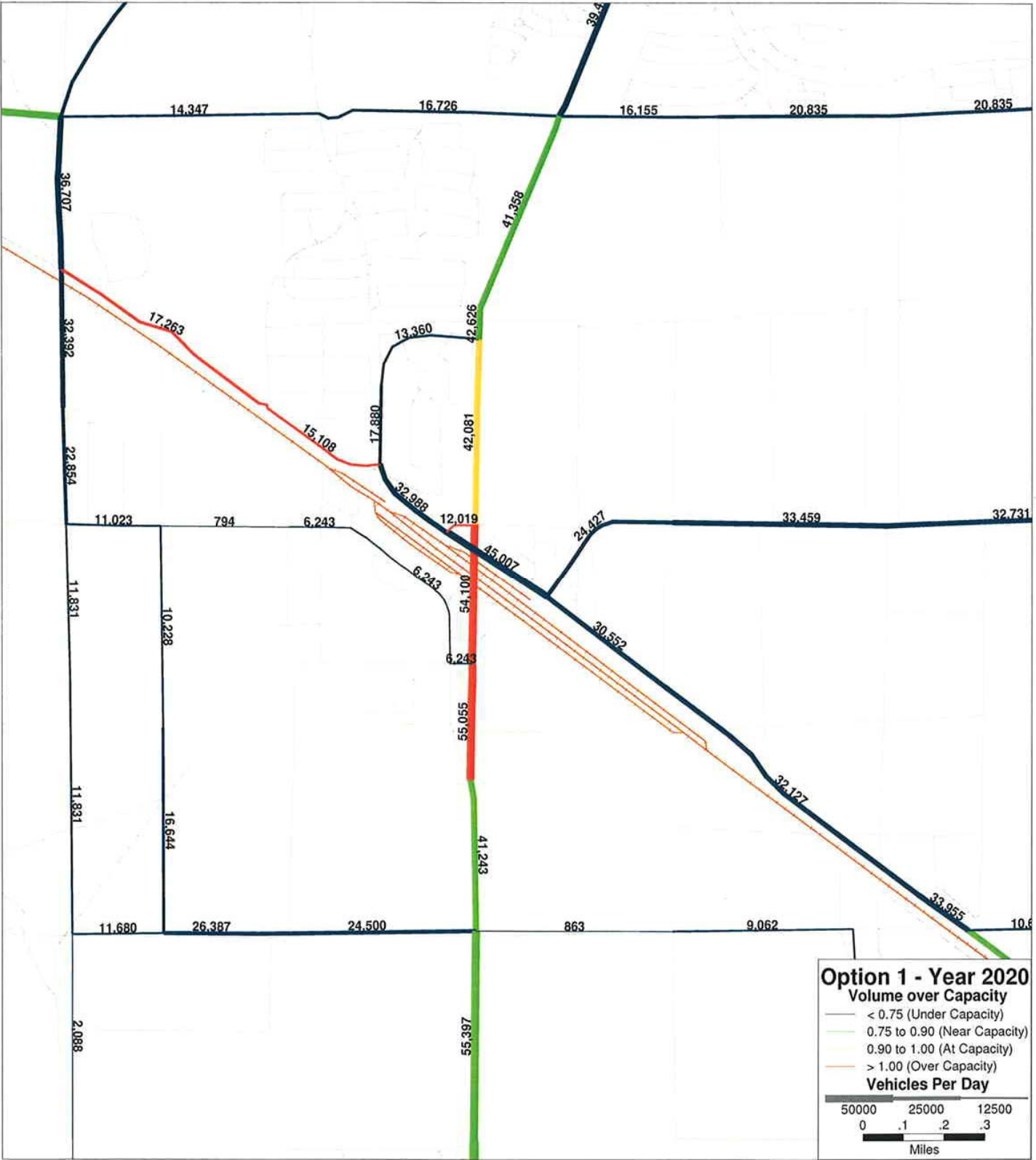
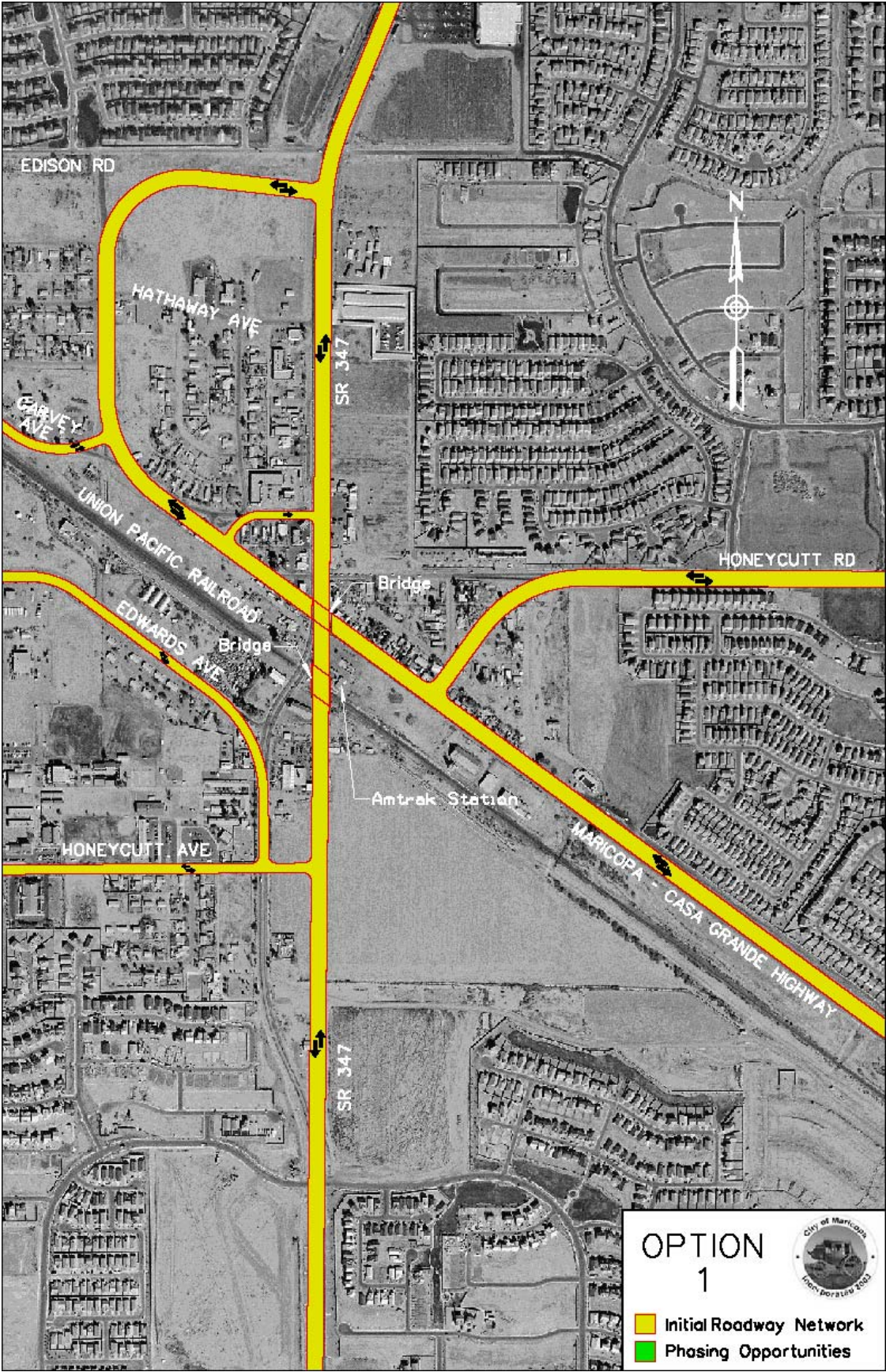
Advantages of Option 1

- Provides high capacity intersections for primary side roadways, including particularly the SR 347- MCGH intersection.
- Provides good separation between major intersections.
- Clarifies a new “downtown” area for the City.
- Much new roadway construction is off existing alignments, allowing existing facilities to maintain traffic.

Disadvantages of Option 1

- As shown, does not provide any high capacity connection to possible regional facility to the west.
- Connection with primary roadways south of UPRR (Honeycutt Avenue, and especially Edwards Ave / McDavid Road) results in less than desirable distances between intersections.
- Few opportunities for interim projects / phased implementation.
- Surrounds City’s downtown area with two high volume roadways; could result in isolating this area.
- Bisects neighborhood northeast of Amtrak Station.

- Not a good configuration for depressing SR 347 under the UPRR. (While not a part of the defined purpose and need for the project, depression of SR 347 below the UPRR – and eliminating the 30-foot plus high overpass has been deemed desirable by the City.)



SR 347 UPRR OPTION 1

DATE: 3/7/2007

ITEM DESCRIPTION		UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	REMOVALS	L.SUM	1	\$500,000.00	\$500,000
2	ROADWAY GRADING	SQ.YD.	245694	\$2.00	\$491,390
3	ROADWAY EXCAVATION	CU.YD.	0	\$8.00	\$0
4	BORROW	CU.YD.	163094	\$12.00	\$1,957,130
5	AGGREGATE BASE, CLASS 2	CU.YD.	50440	\$40.00	\$2,017,600
6	ASPHALTIC CONCRETE (3/4")	TON	45488	\$75.00	\$3,411,600
7	ASPHALTIC CONCRETE (ASPHALT RUBBER)	TON	4549	\$80.00	\$363,920
8	REINFORCED CONCRETE PIPE, 24"	L.FT.	3418	\$110.00	\$375,980
9	REINFORCED CONCRETE PIPE, 36"	L.FT.	17775	\$150.00	\$2,666,250
10	CONCRETE CATCH BASINS	EACH	71	\$5,000.00	\$355,000
11	MANHOLES	EACH	36	\$7,500.00	\$270,000
12	BOX CULVERTS	L.SUM	1	\$900,000.00	\$900,000
13	SIGNING AND STRIPING	L.SUM	1	\$350,000.00	\$350,000
14	LUMINAIRES	EACH	144	\$3,500.00	\$504,000
15	TRAFFIC SIGNALS (3-LEG INTERSECTION)	EACH	4	\$225,000.00	\$900,000
16	CONCRETE CURB	L.FT.	28750	\$18.00	\$517,500
17	CONCRETE CURB AND GUTTER	L.FT.	35550	\$21.00	\$746,550
18	CONCRETE SIDEWALK	SQ.FT.	177750	\$5.00	\$888,750
19	CONCRETE WHEEL CHAIR RAMP	EACH	24	\$1,500.00	\$36,000
20	BEAM GUARD RAIL	L.FT.	1300	\$18.00	\$23,400
21	ATTENUATORS	EACH	2	\$10,000.00	\$20,000
22	CONCRETE HALF BARRIER	L.FT.	1600	\$60.00	\$96,000
23	BRIDGE	SQ.FT.	89600	\$150.00	\$13,440,000
24	RETAINING WALL (CAST-IN-PLACE)	SQ.FT.	17500	\$90.00	\$1,575,000
25	RAILROAD SHOOFLY	L.SUM	0	\$5,250,000.00	\$0
	SUBTOTAL ROADWAY			SUB-TOTAL	\$32,406,070
	MISCELLANEOUS WORK (15%)	L.SUM			\$4,860,911
				SUB-TOTAL	\$37,266,981

	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	DUST PALLIATIVE (1%)	L. SUM			\$372,670
	FURNISH WATER (1%)	L. SUM			\$372,670
	MAINTENANCE OF TRAFFIC (8%)	L. SUM			\$2,981,358
	EROSION CONTROL AND POLLUTION PREVENTION (1%)	L. SUM			\$372,670
	LANDSCAPING, IRRIGATION AND AESTHETICS (2%)	L. SUM			\$745,340
	CONTRACTOR QUALITY CONTROL (2%)	L. SUM			\$745,340
	CONSTRUCTION SURVEYING AND LAYOUT (1%)	L. SUM			\$372,670
				SUB-TOTAL	\$43,229,697
	MOBILIZATION (10%)	L.SUM			\$4,322,970
				SUB-TOTAL	\$47,552,667
	CONTINGENCY (5%)	L. SUM			\$2,377,633
	CONSTRUCTION ENGINEERING (15% OF CONSTRUCTION)	L. SUM			\$7,132,900
	OPTION 1 DETAILED ESTIMATE			SUB-TOTAL	\$57,063,201
	OTHER COST				
	ENGINEERING AND PLANNING (10% OF CONSTRUCTION)	L. SUM			\$5,706,320
	RIGHT-OF-WAY ACQUISITION	AC	37.3	\$500,000.00	\$18,670,000
	UTILITY RELOCATIONS	L. SUM	1.0	\$1,000,000.00	\$1,000,000
				SUB-TOTAL	\$25,376,320
	OPTION 1 TOTAL	L. SUM			\$82,439,521

4.5 Option 2 – “MCGH Disconnect to Honeycutt Road”

4.5.1 General Description

Primary Goals of Option 2:

- Make Honeycutt Road the primary roadway for traffic from the southeast entering onto SR 347, and provide a high capacity intersection between SR 347 and Honeycutt Road.
- Provide a single high capacity SR 347-Honeycutt Road intersection by tying the MCGH into Honeycutt Road east of SR 347 and in a second high capacity tee intersection.
- Configure the project to accommodate possible future improvements including additional grade separations for MCGH directly into SR 347, along a more southerly alignment, and for Honeycutt Road directly west.
- Maintain viability of neighborhood northeast of the Amtrak Station.

Main Features of Option 2:

- SR 347 is grade separated from the UPRR by a single, simple structure.
- MCGH is realigned to tie into Honeycutt Road in a tee intersection, approximately one-quarter mile east of SR 347.
- Honeycutt Road intersects with SR 347 in a new, improved intersection.
- South of the UPRR, SR 347 is realigned east to facilitate new intersection and connections with Honeycutt Avenue / Edwards Avenue.
- Future potential upgrades to the facility are shown including additional UPRR grade separation(s) for MCGH (to the southeast) and Honeycutt Road (to the west); these would provide additional capacity to the system including a relatively high capacity connection to the west.

4.5.2 Option 2 Costs*

Option 2 Cost Summary (Initial Improvements only)	
Construction (including Const. Admin)	\$44.9 million
Engineering	\$4.4 million
Right-of-Way Acquisition (\$500,000 / acre)	\$12.3 million
Total Option 2 Cost	\$61.6 million

*Note regarding cost estimates: It is anticipated that the costs of this project will be shared amongst ADOT, the City of Maricopa and other parties. No effort has been made at this time to determine how the costs will be shared. ADOT policy typically limits ADOT funds to be spent only on ADOT facilities, in this case including only SR 347. Limits are typically to the back of curb returns for reconstruction of intersections with local streets, plus any reconstruction needed to make the current intersection work, e.g. reconstruction to make profiles match.

4.5.3 Possible Refinements for Option 2:

- Depress SR 347 under the UPRR.
- SR347 south of UPRR could be aligned further east or west, to reduce costs and / or improve intersection operations.

4.5.4 Option 2 – Advantages and Disadvantages

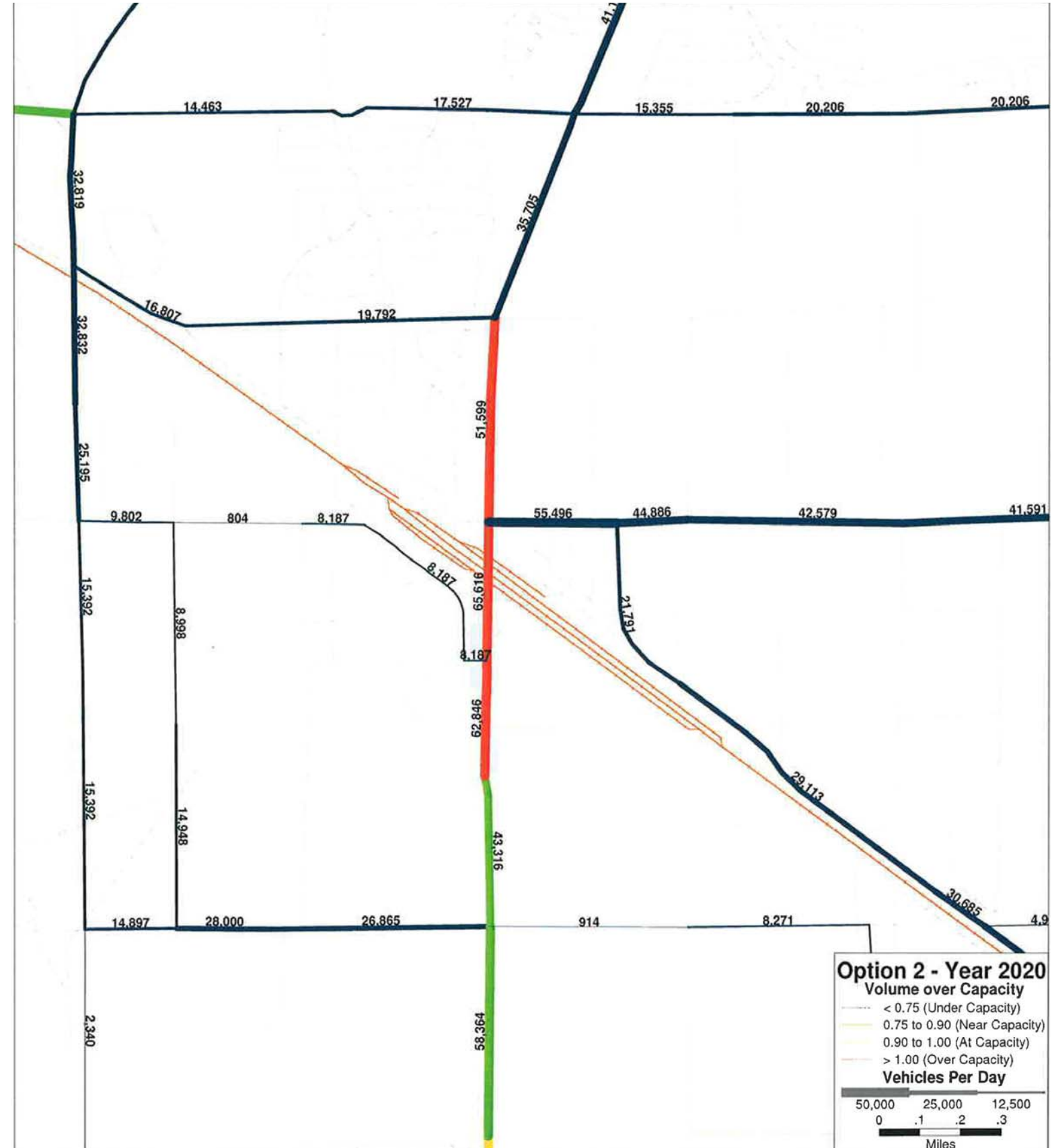
Advantages of Option 2

- Can be phased – future improvements for MCGH and western connections can be delayed until traffic conditions and development warrant their construction.
- Provides potential for high capacity connections with MCGH and to a possible regional facility to the west.
- Retains much of existing community north of the UPRR.
- Retains neighborhood northeast of Amtrak station mostly intact.
- Can be constructed with SR 347 depressed under the UPRR.

Disadvantages of Option 2

- High capacity optional connections with MCGH and to the west require additional grade separations – and high cost.

Note: References in this Section to “Option 2A” are for the Option 2 roadway configuration with SR 347 passing over the UPRR. A separate Option 2B was developed to determine costs and impacts of this same configuration with SR 347 passing under the UPRR. See Section 4.9 of this report for a discussion of the “over vs. under” options.



SR 347 UPRR OPTION 2A (OVER)DATE: 3/7/2007

ITEM DESCRIPTION		UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	REMOVALS	L.SUM	1	\$500,000.00	\$500,000
2	ROADWAY GRADING	SQ.YD.	140417	\$2.00	\$280,830
3	ROADWAY EXCAVATION	CU.YD.	0	\$8.00	\$0
4	BORROW	CU.YD.	257778	\$12.00	\$3,093,340
5	AGGREGATE BASE, CLASS 2	CU.YD.	35115	\$40.00	\$1,404,600
6	ASPHALTIC CONCRETE (3/4")	TON	31693	\$75.00	\$2,376,980
7	ASPHALTIC CONCRETE (ASPHALT RUBBER)	TON	3169	\$80.00	\$253,520
8	REINFORCED CONCRETE PIPE, 24"	L.FT.	2388	\$110.00	\$262,680
9	REINFORCED CONCRETE PIPE, 36"	L.FT.	12175	\$150.00	\$1,826,250
10	CONCRETE CATCH BASINS	EACH	49	\$5,000.00	\$245,000
11	MANHOLES	EACH	25	\$7,500.00	\$187,500
12	BOX CULVERTS	L.SUM	1	\$900,000.00	\$900,000
13	SIGNING AND STRIPING	L.SUM	1	\$350,000.00	\$350,000
14	LUMINAIRES	EACH	102	\$3,500.00	\$357,000
15	TRAFFIC SIGNALS (3-LEG INTERSECTION)	EACH	3	\$225,000.00	\$675,000
16	CONCRETE CURB	L.FT.	20450	\$18.00	\$368,100
17	CONCRETE CURB AND GUTTER	L.FT.	24350	\$21.00	\$511,350
18	CONCRETE SIDEWALK	SQ.FT.	121750	\$5.00	\$608,750
19	CONCRETE WHEEL CHAIR RAMP	EACH	18	\$1,500.00	\$27,000
20	BEAM GUARD RAIL	L.FT.	1300	\$18.00	\$23,400
21	ATTENUATORS	EACH	3	\$10,000.00	\$30,000
22	CONCRETE HALF BARRIER	L.FT.	4000	\$60.00	\$240,000
23	BRIDGE	SQ.FT.	38400	\$150.00	\$5,760,000
24	RETAINING WALL (CAST-IN-PLACE)	SQ.FT.	52013	\$90.00	\$4,681,170
25	RAILROAD SHOOFLY	L.SUM	0	\$5,250,000.00	\$0
	SUB-TOTAL ROADWAY				\$24,962,470
	MISCELLANEOUS WORK (15%)	L.SUM			\$3,744,371
				SUB-TOTAL	\$28,706,841
	DUST PALLIATIVE (1%)	L. SUM			\$287,068
	FURNISH WATER (1%)	L. SUM			\$287,068

	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	MAINTENANCE OF TRAFFIC (8%)	L. SUM			\$2,296,547
	EROSION CONTROL AND POLLUTION PREVENTION (1%)	L. SUM			\$287,068
	LANDSCAPING, IRRIGATION AND AESTHETICS (2%)	L. SUM			\$574,137
	CONTRACTOR QUALITY CONTROL (2%)	L. SUM			\$574,137
	CONSTRUCTION SURVEYING AND LAYOUT (1%)	L. SUM			\$287,068
				SUB-TOTAL	\$33,299,935
	MOBILIZATION (10%)	L.SUM			\$3,329,993
				SUB-TOTAL	\$36,629,928
	CONTINGENCY (5%)	L. SUM			\$1,831,496
	CONSTRUCTION ENGINEERING (15% OF CONSTRUCTION)	L. SUM			\$5,494,489
	OPTION 2A DETAILED ESTIMATE			SUB-TOTAL	\$43,955,914
	OTHER COST				
	ENGINEERING AND PLANNING (10% OF CONSTRUCTION)	L. SUM			\$4,395,591
	RIGHT-OF-WAY ACQUISITION	AC	24.5	\$500,000.00	\$12,250,000
	UTILITY RELOCATIONS	L.SUM	1	\$1,000,000.00	\$1,000,000
				SUB-TOTAL	\$17,645,591
	OPTION 2A TOTAL	L. SUM			\$61,601,506

4.6 Option 3 – “Honeycutt Road Disconnect into MCGH”

4.6.1 General Description

Primary Goals of Option 3:

- Make the MCGH the primary connection with SR 347, and disconnect Honeycutt Road into MCGH.
- Provide options for future expansion.

Main Features of Option 3:

- A single, simple SR 347-UPRR grade separation is provided.
- MCGH is realigned to connect with SR 347 in a new, high-capacity intersection.
- Honeycutt Road is realigned to tie into MCGH in a new tee intersection, approximately one-quarter mile east of SR 347.
- South of the UPRR, SR 347 is realigned east to facilitate new intersection and connections with Honeycutt Avenue / Edwards Avenue.
- Possible future improvements include an additional MCGH-UPRR grade separation west of SR 347 – to tie to new facility to the west

4.6.2 Option 3 Costs*

Option 3 Cost Summary (Initial Improvements only)	
Construction (including Const. Admin)	\$45.7 million
Engineering	\$4.5 million
Right-of-Way Acquisition (\$500,000 / acre)	\$12.8 million
Total Option 3 Cost	\$63.0 million

*Note regarding cost estimates: It is anticipated that the costs of this project will be shared amongst ADOT, the City of Maricopa and other parties. No effort has been made at this time to determine how the costs will be shared. ADOT policy typically limits ADOT funds to be spent only on ADOT facilities, in this case including only SR 347. Limits are typically to the back of curb returns for reconstruction of intersections with local streets, plus any reconstruction needed to make the current intersection work, e.g. reconstruction to make profiles match.

4.6.3 Possible Refinements for Option 3:

- Could be built with SR 347 going over or under the UPRR.
- SR347 south of UPRR could be aligned further east or west, to reduce costs and / or improve intersection operations.

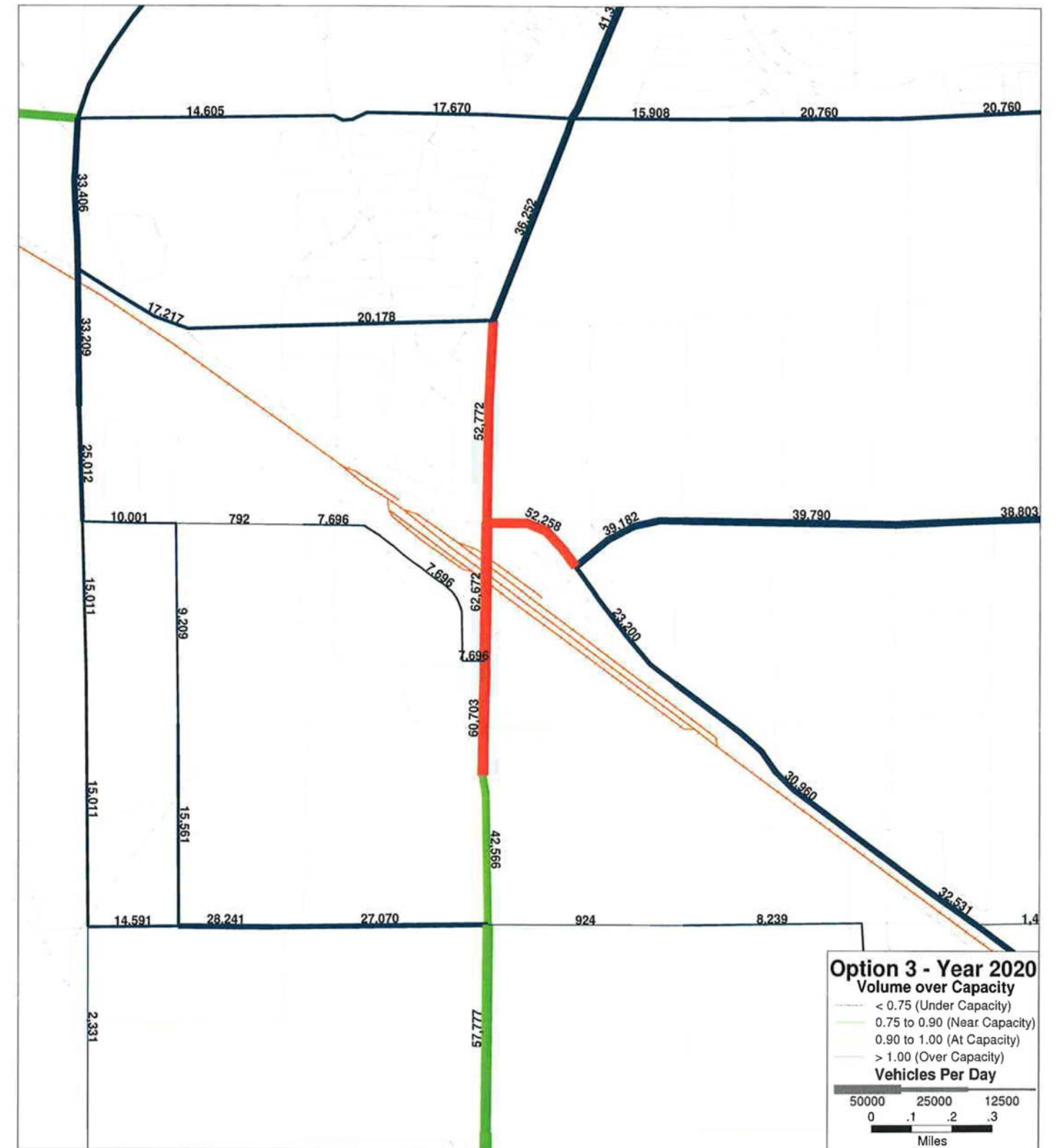
4.6.4 Option 3 – Advantages and Disadvantages

Advantages of Option 3

- High capacity intersection is provided for MCGH with SR 347
- SR 347 could be depressed under the UPRR.
- Provides potential for increasing capacity in the future with the additional MCGH-UPRR grade separation to the west.
- Minimal impact to commercial area west of SR 347

Disadvantages of Option 3

- Substantial effects to neighborhood northeast of the Amtrak station.
- Less opportunity for phased implementation compared with Option 2.
- Connections with streets in southwest quadrant are less than optimum.



SR 347 UPRR OPTION 3

DATE: 3/7/2007

ITEM DESCRIPTION		UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	REMOVALS	L.SUM	1	\$750,000.00	\$750,000
2	ROADWAY GRADING	SQ.YD.	139583	\$2.00	\$279,170
3	ROADWAY EXCAVATION	CU.YD.	0	\$8.00	\$0
4	BORROW	CU.YD.	257778	\$12.00	\$3,093,340
5	AGGREGATE BASE, CLASS 2	CU.YD.	34959	\$40.00	\$1,398,360
6	ASPHALTIC CONCRETE (3/4")	TON	31552	\$75.00	\$2,366,400
7	ASPHALTIC CONCRETE (ASPHALT RUBBER)	TON	3155	\$80.00	\$252,400
8	REINFORCED CONCRETE PIPE, 24"	L.FT.	2377	\$110.00	\$261,470
9	REINFORCED CONCRETE PIPE, 36"	L.FT.	12125	\$150.00	\$1,818,750
10	CONCRETE CATCH BASINS	EACH	49	\$5,000.00	\$245,000
11	MANHOLES	EACH	25	\$7,500.00	\$187,500
12	BOX CULVERTS	L.SUM	1	\$900,000.00	\$900,000
13	SIGNING AND STRIPING	L.SUM	1	\$350,000.00	\$350,000
14	LUMINAIRES	EACH	102	\$3,500.00	\$357,000
15	TRAFFIC SIGNALS (3-LEG INTERSECTION)	EACH	3	\$225,000.00	\$675,000
16	CONCRETE CURB	L.FT.	20350	\$18.00	\$366,300
17	CONCRETE CURB AND GUTTER	L.FT.	24250	\$21.00	\$509,250
18	CONCRETE SIDEWALK	SQ.FT.	121250	\$5.00	\$606,250
19	CONCRETE WHEEL CHAIR RAMP	EACH	18	\$1,500.00	\$27,000
20	BEAM GUARD RAIL	L.FT.	1300	\$18.00	\$23,400
21	ATTENUATORS	EACH	3	\$10,000.00	\$30,000
22	CONCRETE HALF BARRIER	L.FT.	4000	\$60.00	\$240,000
23	BRIDGE	SQ.FT.	38400	\$150.00	\$5,760,000
24	RETAINING WALL (CAST-IN-PLACE)	SQ.FT.	54550	\$90.00	\$4,909,500
25	RAILROAD SHOOFLY	L.SUM	0	\$5,250,000.00	\$0
	SUB-TOTAL ROADWAY			SUB-TOTAL	\$25,406,090
	MISCELLANEOUS WORK (15%)	L.SUM			\$3,810,914
				SUB-TOTAL	\$29,217,004

	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	DUST PALLIATIVE (1%)	L. SUM			\$292,170
	FURNISH WATER (1%)	L. SUM			\$292,170
	MAINTENANCE OF TRAFFIC (8%)	L. SUM			\$2,337,360
	EROSION CONTROL AND POLLUTION PREVENTION (1%)	L. SUM			\$292,170
	LANDSCAPING, IRRIGATION AND AESTHETICS (2%)	L. SUM			\$584,340
	CONTRACTOR QUALITY CONTROL (2%)	L. SUM			\$584,340
	CONSTRUCTION SURVEYING AND LAYOUT (1%)	L. SUM			\$292,170
				SUB-TOTAL	\$33,891,724
	MOBILIZATION (10%)	L.SUM			\$3,389,172
				SUB-TOTAL	\$37,280,896
	CONTINGENCY (5%)	L. SUM			\$1,864,045
	CONSTRUCTION ENGINEERING (15% OF CONSTRUCTION)	L. SUM			\$5,592,134
	OPTION 3 DETAILED ESTIMATE			SUB-TOTAL	\$44,737,076
	OTHER COST				
	ENGINEERING AND PLANNING (10% OF CONSTRUCTION)	L. SUM			\$4,473,708
	RIGHT-OF-WAY ACQUISITION	AC	25.5	\$500,000.00	\$12,750,000
	UTILITY RELOCATIONS	L.SUM	1	\$1,000,000.00	\$1,000,000
				SUB-TOTAL	\$18,223,708
	OPTION 3 TOTAL	L. SUM			\$62,960,783

4.7 Option 4 – “Trumpet Interchange”

4.7.1 General Description

Primary Goal of Option 4:

- Make the MCGH the primary roadway serving the area east and south of the project, and provide a high capacity intersection (interchange) between the MCGH and SR 347, for all movements

Main Features of Option 4:

- New trumpet interchange is provided between MCGH and SR 347, including high capacity free-flow ramps between SR 347 to / from MCGH.
- Includes two grade separation structures over the UPRR, including for the SR 347 mainline and the SR 347 NB to MCGH SE-bound roadway.
- Honeycutt Road is disconnected into MCGH, in a new “T” intersection located one-quarter mile east of SR 347.
- South of the UPRR, SR 347 is realigned to the east, to provide improved access to Honeycutt Avenue and Edwards Avenue.

4.7.2 Option 4 Costs*

Option 4 Cost Summary (Initial Improvements only)	
Construction (including Const. Admin)	\$60.9 million
Engineering	\$6.0 million
Right-of-Way Acquisition (\$500,000 / acre)	\$19.2 million
Total Option 4 Cost	\$86.1 million

*Note regarding cost estimates: It is anticipated that the costs of this project will be shared amongst ADOT, the City of Maricopa and other parties. No effort has been made at this time to determine how the costs will be shared. ADOT policy typically limits ADOT funds to be spent only on ADOT facilities, in this case including only SR 347. Limits are typically to the back of curb returns for reconstruction of intersections with local streets, plus any reconstruction needed to make the current intersection work, e.g. reconstruction to make profiles match.

4.7.3 Possible Refinements for Option 4:

- SR347 south of UPRR could be aligned further east or west, to reduce costs and / or improve intersection operations.

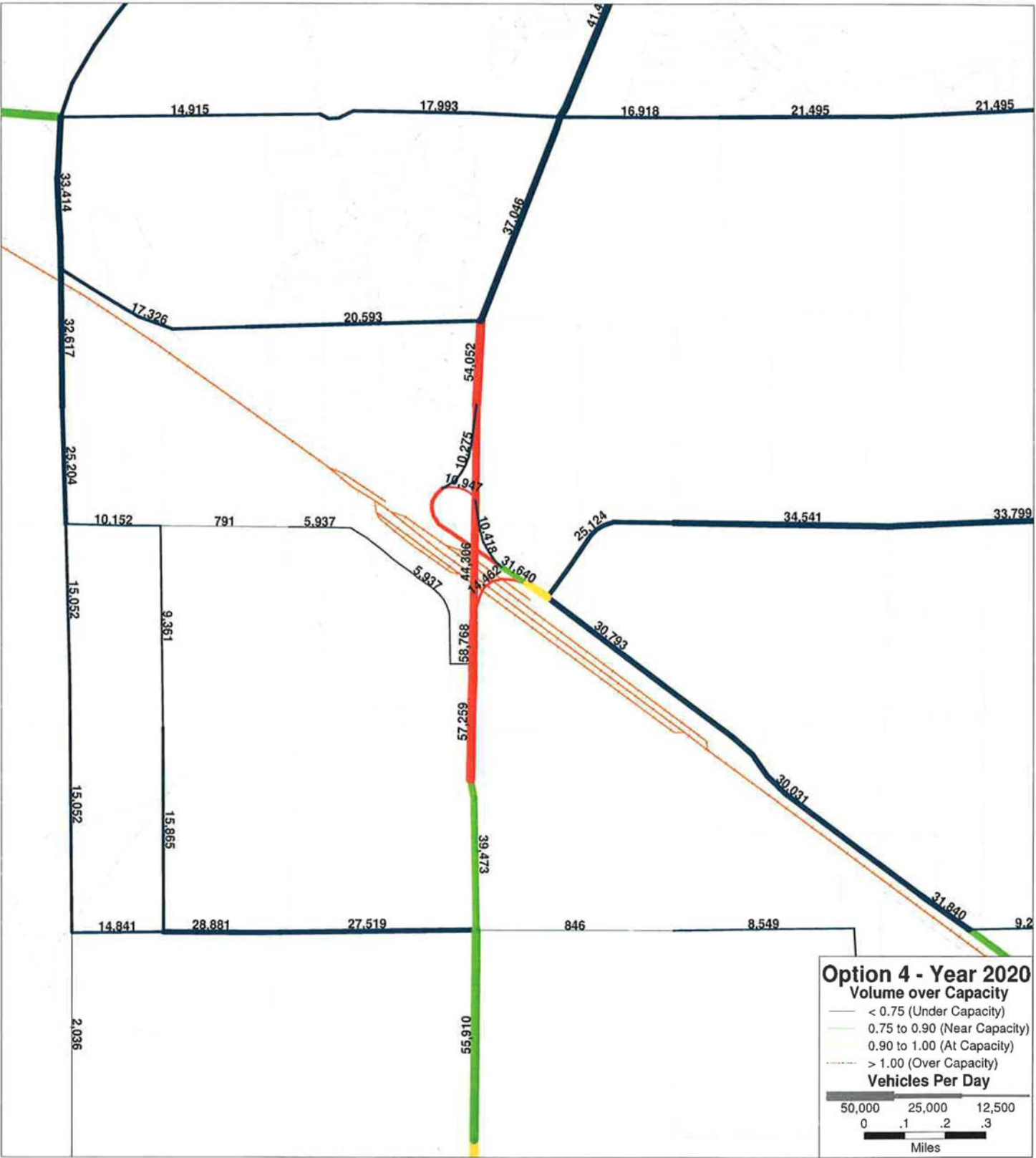
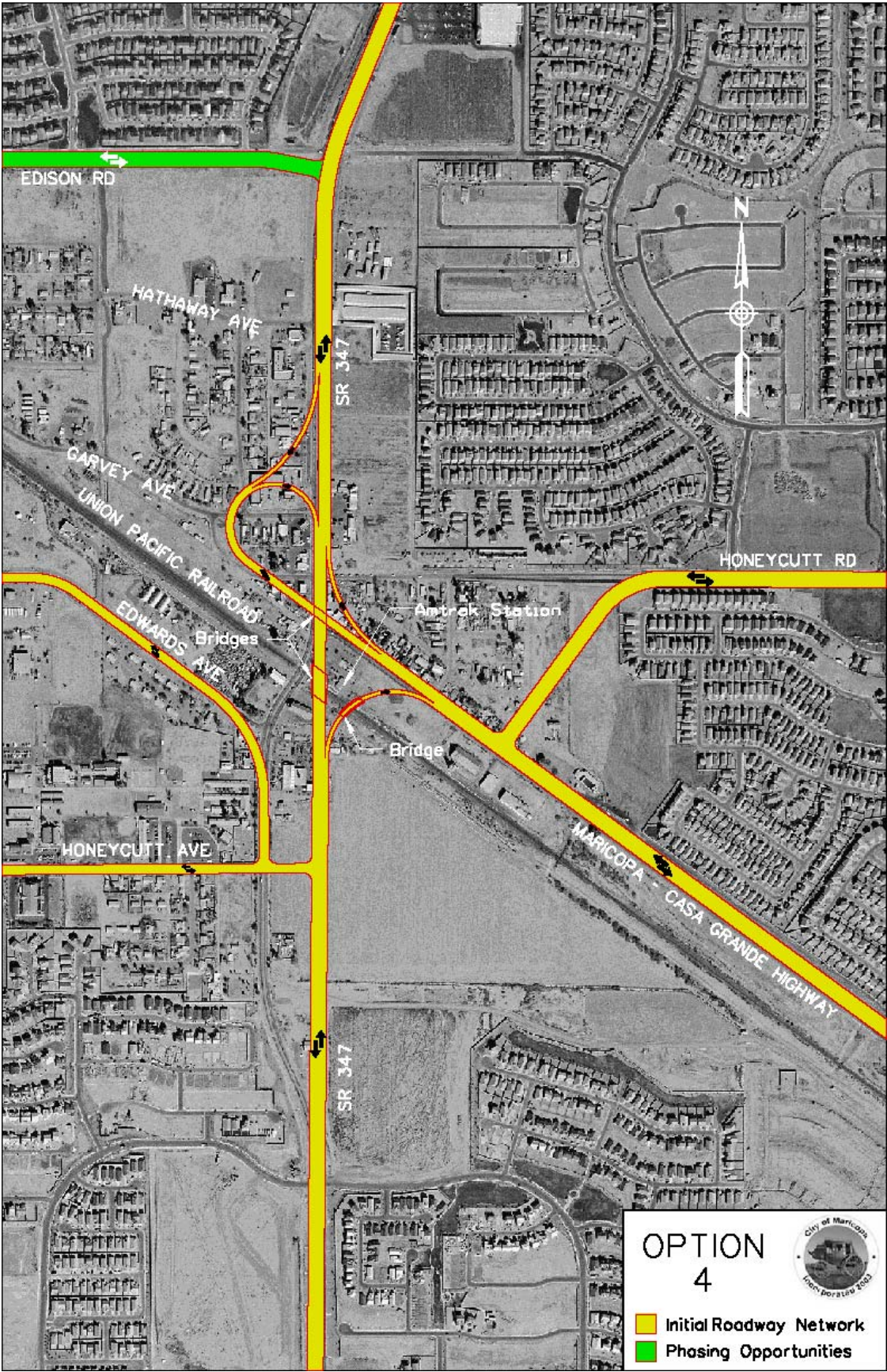
4.7.4 Option 4 – Advantages and Disadvantages

Advantages of Option 4

- Provides high-capacity, free-flow ramps for major movement in the area, i.e. between SR 347 and MCGH.

Disadvantages of Option 4

- Tight geometry for some of the ramp movements.
- Impacts major portions of the neighborhood and commercial developments in the project area.
- Close proximity of the Honeycutt Road-MCGH intersection to the interchange may present weaving problems for some of the movements.
- Few opportunities for phasing / interim improvements projects.
- No good opportunity for high-capacity connection to the west.
- High cost, complex structures over the UPRR.
- Not a viable option for SR 347-under-UPRR.



SR 347 UPRR OPTION 4

DATE: 3/7/2007

ITEM DESCRIPTION		UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	REMOVALS	L.SUM	1	\$3,000,000.00	\$3,000,000
2	ROADWAY GRADING	SQ.YD.	171389	\$2.00	\$342,780
3	ROADWAY EXCAVATION	CU.YD.	0	\$8.00	\$0
4	BORROW	CU.YD.	281404	\$12.00	\$3,376,850
5	AGGREGATE BASE, CLASS 2	CU.YD.	42988	\$40.00	\$1,719,520
6	ASPHALTIC CONCRETE (3/4")	TON	37846	\$75.00	\$2,838,450
7	ASPHALTIC CONCRETE (ASPHALT RUBBER)	TON	3785	\$80.00	\$302,800
8	REINFORCED CONCRETE PIPE, 24"	L.FT.	11939	\$110.00	\$1,313,290
9	REINFORCED CONCRETE PIPE, 36"	L.FT.	10975	\$150.00	\$1,646,250
10	CONCRETE CATCH BASINS	EACH	64	\$5,000.00	\$320,000
11	MANHOLES	EACH	32	\$7,500.00	\$240,000
12	BOX CULVERTS	L.SUM	1	\$900,000.00	\$900,000
13	SIGNING AND STRIPING	L.SUM	1	\$350,000.00	\$350,000
14	LUMINAIRES	EACH	139	\$3,500.00	\$486,500
15	TRAFFIC SIGNALS (3-LEG INTERSECTION)	EACH	2	\$225,000.00	\$450,000
16	CONCRETE CURB	L.FT.	18050	\$18.00	\$324,900
17	CONCRETE CURB AND GUTTER	L.FT.	40370	\$21.00	\$847,770
18	CONCRETE SIDEWALK	SQ.FT.	109750	\$5.00	\$548,750
19	CONCRETE WHEEL CHAIR RAMP	EACH	12	\$1,500.00	\$18,000
20	BEAM GUARD RAIL	L.FT.	4750	\$18.00	\$85,500
21	ATTENUATORS	EACH	3	\$10,000.00	\$30,000
22	CONCRETE HALF BARRIER	L.FT.	0	\$60.00	\$0
23	BRIDGE	SQ.FT.	99350	\$150.00	\$14,902,500
24	RETAINING WALL (CAST-IN-PLACE)	SQ.FT.	0	\$90.00	\$0
25	RAILROAD SHOOFLY	L.SUM	0	\$5,250,000.00	\$0
	SUB-TOTAL ROADWAY			SUB-TOTAL	\$34,043,860
	MISCELLANEOUS WORK (15%)	L.SUM			\$5,106,579
				SUB-TOTAL	\$39,150,439

	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	DUST PALLIATIVE (1%)	L. SUM			\$391,504
	FURNISH WATER (1%)	L. SUM			\$391,504
	MAINTENANCE OF TRAFFIC (8%)	L. SUM			\$3,132,035
	EROSION CONTROL AND POLLUTION PREVENTION (1%)	L. SUM			\$391,504
	LANDSCAPING, IRRIGATION AND AESTHETICS (2%)	L. SUM			\$783,009
	CONTRACTOR QUALITY CONTROL (2%)	L. SUM			\$783,009
	CONSTRUCTION SURVEYING AND LAYOUT (1%)	L. SUM			\$391,504
				SUB-TOTAL	\$45,414,509
	MOBILIZATION (10%)	L.SUM			\$4,541,451
				SUB-TOTAL	\$49,955,960
	CONTINGENCY (5%)	L. SUM			\$2,497,798
	CONSTRUCTION ENGINEERING (15% OF CONSTRUCTION)	L. SUM			\$7,493,394
	OPTION 4 DETAILED ESTIMATE			SUB-TOTAL	\$59,947,152
	OTHER COST				
	ENGINEERING AND PLANNING (10% OF CONSTRUCTION)	L. SUM			\$5,994,715
	RIGHT-OF-WAY ACQUISITION	AC	38.4	\$500,000.00	\$19,200,000
	UTILITY RELOCATIONS	L.SUM	1	\$1,000,000.00	\$1,000,000
				SUB-TOTAL	\$26,194,715
	OPTION 4 TOTAL	L. SUM			\$86,141,867

4.8 Option 5 – “SR347-MCGH Phased TI”

4.8.1 General Description

Primary Goals of Option 5:

- Address immediate need for a SR 347 grade separation while making provisions for future, high-capacity connection from MCGH to SR 347 – and to the west.

Main Features of Option 5

- Provide two simple grade separation structures over the UPRR –for SR 347 and MCGH.
- Make major realignment / reconstruction of MCGH, including to provide a phased intersection/interchange with SR 347, and to serve as a major east-west connector to the west.
- As part of initial construction, provide an at-grade intersection between SR 347 and MCGH which could be upgraded in the future to a full TI (tight diamond, SPUI, or similar).
- Realign SR 347 south of UPRR to the west, to provide space for a new intersection/interchange with MCGH.
- Provide a new tee intersection between SR 347 and Honeycutt Road.
- The SR 347-UPRR grade separation could be depressed.

4.8.2 Option 5 Costs*

Option 5 Cost Summary (Initial Improvements only)	
Construction (including Const. Admin)	\$84.7 million
Engineering	\$8.4 million
Right-of-Way Acquisition (\$500,000 / acre)	\$20.5 million
Total Option 5 Cost	\$113.6 million

*Note regarding cost estimates: It is anticipated that the costs of this project will be shared amongst ADOT, the City of Maricopa and other parties. No effort has been made at this time to determine how the costs will be shared. ADOT policy typically limits ADOT funds to be spent only on ADOT facilities, in this case including only SR 347. Limits are typically to the back of curb returns for reconstruction of intersections with local streets, plus any reconstruction needed to make the current intersection work, e.g. reconstruction to make profiles match.

4.8.3 Enhancements / Adjustments for Option 5:

- The SR 347-UPRR grade separation could be built with SR 347 going under the railroad.
- Maintain or upgrade SR 347 intersection with Edison Road.
- Provide future overpass to connect Edwards Avenue with SR 347/Honeycutt Road intersection.

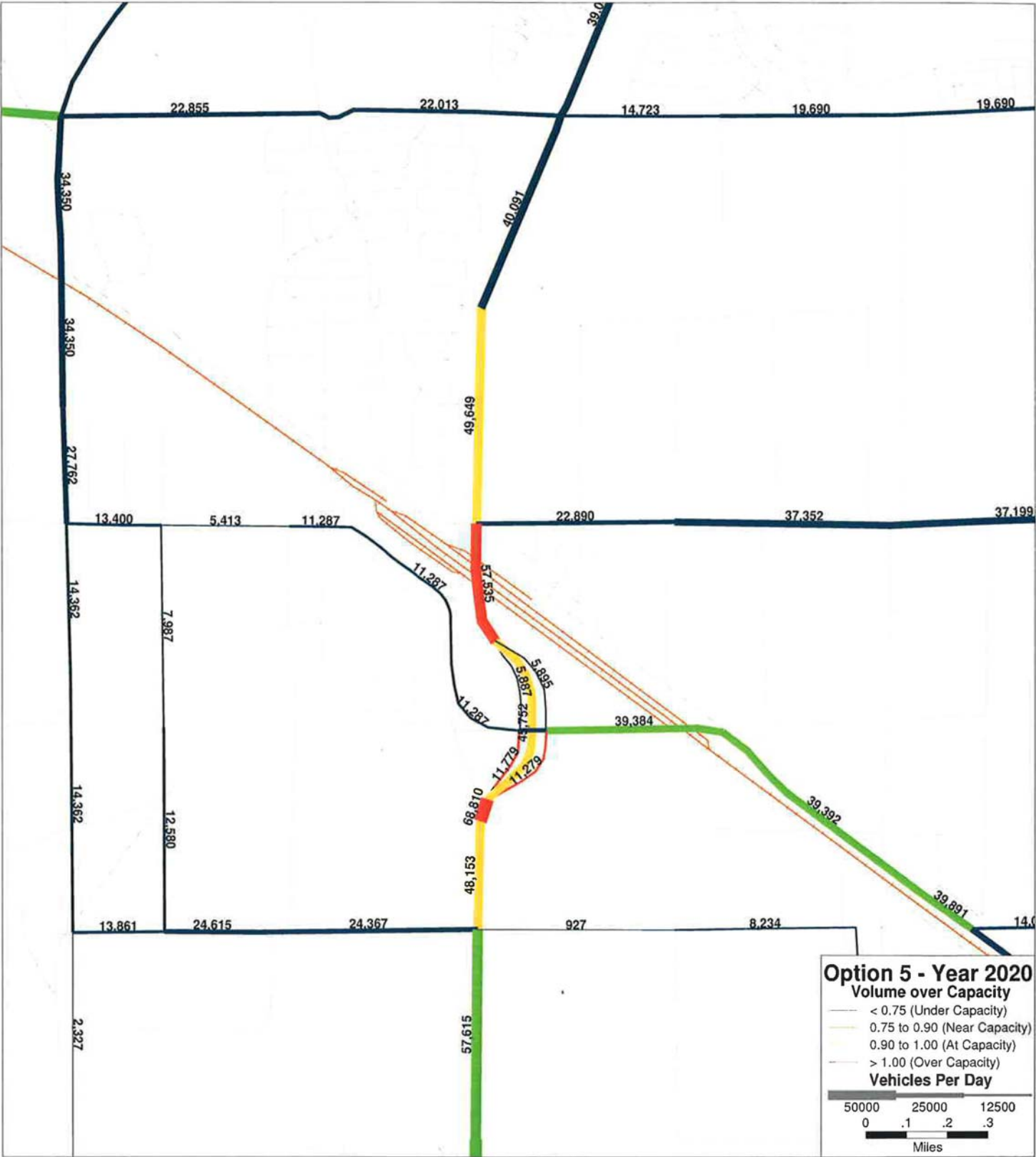
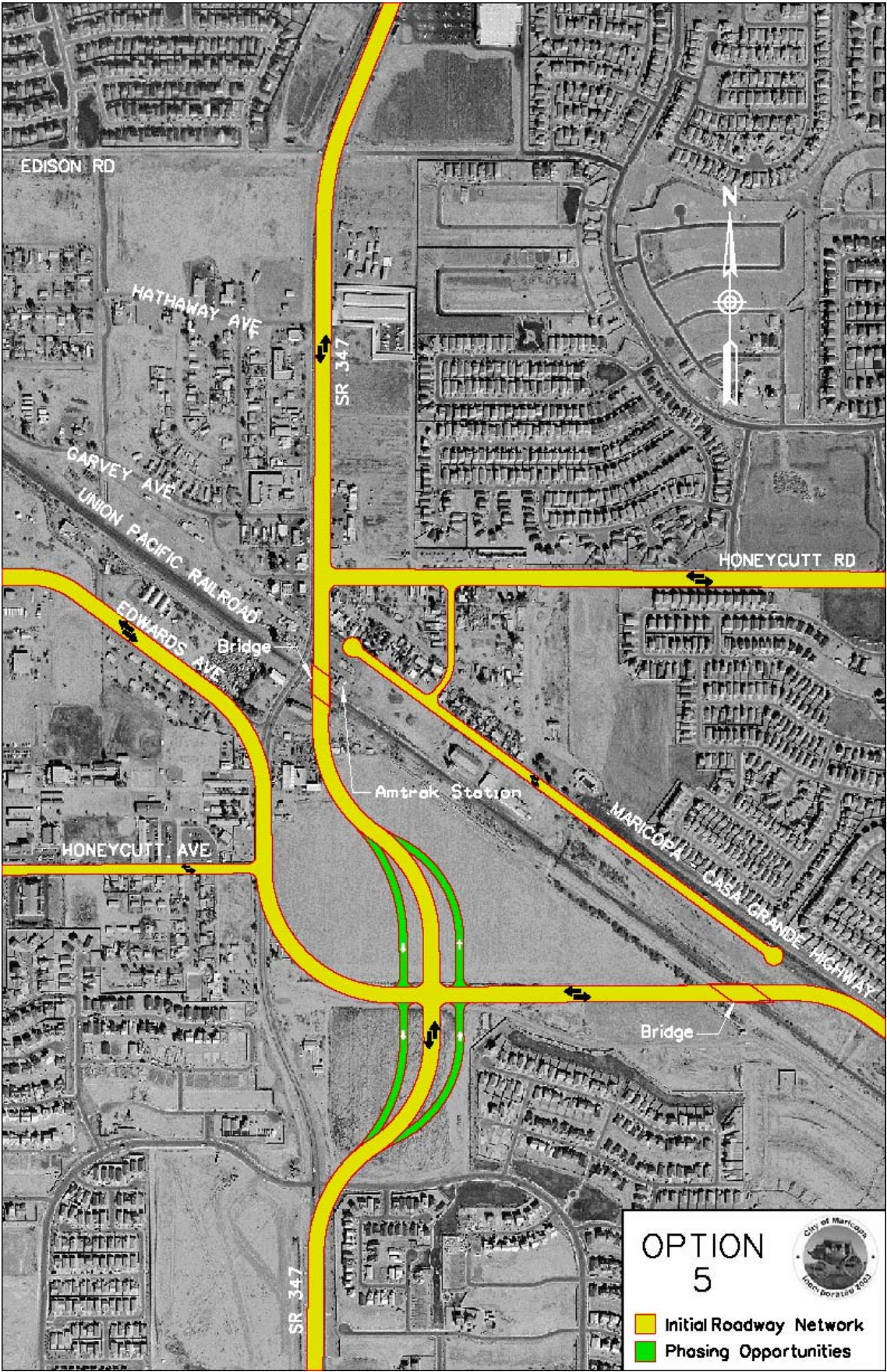
4.8.4 Option 5 – Advantages and Disadvantages

Advantages of Option 5

- Provides high capacity configurations for SR 347 and a new east-west facility, “New” MCGH south of the UPRR.
- Provides good SR347-Honeycutt Road connection
- Construction of the SR347-New MCGH intersection/interchange can be phased.
- Retains most of the neighborhoods and commercial areas north of the UPRR intact.
- SR 347 can be depressed under the UPRR.

Disadvantages of Option 5

- High initial cost – as currently proposed, two major UPRR grade separations would be constructed as part of the initial project.
- Geometry of the realigned MCGH west of SR 347 – the sharp curve between the SR 347 and Honeycutt Avenue intersections – is undesirable.
- Few opportunities for interim projects / phased construction.



SR 347 UPRR OPTION 5

DATE: 3/7/2007

ITEM DESCRIPTION		UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	REMOVALS	L.SUM	1	\$1,000,000.00	\$1,000,000
2	ROADWAY GRADING	SQ.YD.	137333	\$2.00	\$274,670
3	ROADWAY EXCAVATION	CU.YD.	0	\$8.00	\$0
4	BORROW	CU.YD.	785620	\$12.00	\$9,427,440
5	AGGREGATE BASE, CLASS 2	CU.YD.	49788	\$40.00	\$1,991,520
6	ASPHALTIC CONCRETE (3/4")	TON	44519	\$75.00	\$3,338,930
7	ASPHALTIC CONCRETE (ASPHALT RUBBER)	TON	4452	\$80.00	\$356,160
8	REINFORCED CONCRETE PIPE, 24"	L.FT.	7144	\$110.00	\$785,840
9	REINFORCED CONCRETE PIPE, 36"	L.FT.	15550	\$150.00	\$2,332,500
10	CONCRETE CATCH BASINS	EACH	70	\$5,000.00	\$350,000
11	MANHOLES	EACH	35	\$7,500.00	\$262,500
12	BOX CULVERTS	L.SUM	1	\$900,000.00	\$900,000
13	SIGNING AND STRIPING	L.SUM	1	\$400,000.00	\$400,000
14	LUMINAIRES	EACH	158	\$3,500.00	\$553,000
15	TRAFFIC SIGNALS (3-LEG INTERSECTION)	EACH	2	\$225,000.00	\$450,000
16	TRAFFIC SIGNALS (4-LEG INTERSECTION)	EACH	2	\$300,000.00	\$600,000
17	CONCRETE CURB	L.FT.	27640	\$18.00	\$497,520
18	CONCRETE CURB AND GUTTER	L.FT.	37900	\$21.00	\$795,900
19	CONCRETE SIDEWALK	SQ.FT.	155550	\$5.00	\$777,750
20	CONCRETE WHEEL CHAIR RAMP	EACH	36	\$1,500.00	\$54,000
21	BEAM GUARD RAIL	L.FT.	8500	\$18.00	\$153,000
22	ATTENUATORS	EACH	7	\$10,000.00	\$70,000
23	CONCRETE HALF BARRIER	L.FT.	4000	\$60.00	\$240,000
24	BRIDGE	SQ.FT.	115200	\$150.00	\$17,280,000
25	RETAINING WALL (CAST-IN-PLACE)	SQ.FT.	52013	\$90.00	\$4,681,170
26	RAILROAD SHOOFLY	L.SUM	0	\$5,250,000.00	\$0
	SUB-TOTAL ROADWAY			SUB-TOTAL	\$47,571,900
	MISCELLANEOUS WORK (15%)	L.SUM			\$7,135,785
				SUB-TOTAL	\$54,707,685

	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	DUST PALLIATIVE (1%)	L. SUM			\$547,077
	FURNISH WATER (1%)	L. SUM			\$547,077
	MAINTENANCE OF TRAFFIC (8%)	L. SUM			\$4,376,615
	EROSION CONTROL AND POLLUTION PREVENTION (1%)	L. SUM			\$547,077
	LANDSCAPING, IRRIGATION AND AESTHETICS (2%)	L. SUM			\$1,094,154
	CONTRACTOR QUALITY CONTROL (2%)	L. SUM			\$1,094,154
	CONSTRUCTION SURVEYING AND LAYOUT (1%)	L. SUM			\$547,077
				SUB-TOTAL	\$63,460,915
	MOBILIZATION (10%)	L.SUM			\$6,346,091
				SUB-TOTAL	\$69,807,006
	CONTINGENCY (5% OF CONSTRUCTION)	L. SUM			\$3,490,350
	CONSTRUCTION ENGINEERING (15% OF CONSTRUCTION)	L. SUM			\$10,471,051
	OPTION 5 DETAILED ESTIMATE			SUB-TOTAL	\$83,768,407
	OTHER COST				
	ENGINEERING AND PLANNING (10% OF CONSTRUCTION)	L. SUM			\$8,376,841
	RIGHT-OF-WAY ACQUISITION	AC	40.9	\$500,000.00	\$20,450,000
	UTILITY RELOCATIONS	L.SUM	1	\$1,000,000.00	\$1,000,000
				SUB-TOTAL	\$29,826,841
	OPTION 5 TOTAL	L. SUM			\$113,595,248

4.9 SR 347 – Union Pacific Railroad Grade Separation– Over vs. Under / Structures

4.9.1 Introduction

It has always been in the scope and intent of this study to consider options for both elevating SR 347 over the UPRR, and depressing SR 347 to go under the UPRR. The proposed grade separation structure is the main component of the project and is the top priority identified by the City and ADOT. The grade separation determination works closely with the roadway alternatives analysis. The structural criteria and corridor constraints described in this report are the base elements of the evaluation. In order to determine the most cost effective – and beneficial – option for crossing the railroad, both overpass and underpass alternatives are discussed for SR 347. The costs and benefits of “over” versus “under” are discussed in this section.

(Note: A third arrangement, suggested during the Agency Scoping Meeting, would be to partially depress or elevate the railroad and partially elevate or depress SR 347. This concept of “splitting the difference” appears to maximize project costs, requires the complete UPRR relocation and complete bridge construction while only partially achieving the benefits of an SR 347 “depressed” option, that is fewer visual and noise impacts. This option has not been further investigated.)

SR 347 Over UPRR

This alternative consists of a bridge crossing over the existing UPRR. The typical section of the bridge crossing consists of six travel lanes, outside shoulders, a wide center median, sidewalks on each side and possibly other elements associated with a “signature street” designation. Retaining walls would be used instead of side slopes to minimize right-of-way takes. The bridge is in the middle of a crest vertical curve and surface runoff can be conveyed to the north and south for collection off the bridge avoiding costs and typically non-pleasing aesthetics associated with bridge drainage systems.

Preliminary bridge layout and span arrangements (see Appendix C) considered the following features:

- 1. Spanning over three mainline tracks and access road on each side of the tracks (All Roadway Options)
- 2. Provide location flexibility for the future third track as its proposed location is unknown (All Roadway Options)
- 3. Preference of UPRR of not having abutments within their right-of-way (All Roadway Options)
- 4. Accommodate additional roadways to pass under the bridge (Roadway Options 1 and 4)

The UPRR right-of-way is 100’ south and 275’ north of the centerline of the existing track. UPRR has indicated their preference of not having bridge abutments within their right-of-way because it impedes the continuity of the property for future use. A three span structure is considered with span lengths of approximately 100’. The south span ends outside of the UPRR right-of-way limits, the middle span crosses over the entire mainline track section and the north span ends within the UPRR right-of way. Discussions with UPRR indicate they may be willing to accept the abutment within the right-of-way due to the excessive right-of-way width and gave direction to continue advancing this option forward for consideration. The north and south open spans provide flexibility for lessening impacts to the Amtrak Station and for the location of the future third track respectively. Roadway Options 1 and 4 propose extending the length of the bridge to the north by approximately 400’ to allow other roadways to pass under SR 347. Girder construction is proposed because of (1) flexibility of span arrangements, (2) cost competitiveness, (3) composes the top four of the list of UPRR preferred bridge alternatives, (4) ease of erection, (5) does not require false work and (6) provides flexibility for adding additional spans for Roadway Options 1 and 4.

Table 4-1 SR 347 over UPRR

Advantages:	Disadvantages
- Lower construction cost	- Visual impacts to the community
- Minimum impact to Amtrak station	- ROW impacts/access
- Minimum impact to UPRR operations	- RR clearance requirements/length of project
- Traffic circulation flexibility	- Fill/embankment source
- Shorter construction duration	

SR 347 Under UPRR

This alternative consists of SR 347 crossing under the existing UPRR. The typical section of the underpass would be the same as the over crossing: six travel lanes, outside shoulders, continuation of the wide median, and sidewalks on each side. Two alternatives are possible for the underpass: a cut-and-cover bridge, and tunnel jacking. The more conventional cut-and-cover concept is discussed here; information on a tunneling / jacking option is included in Appendix E.

SR 347 Under UPRR (Cut-and-Cover Alternative)

This alternative (see drawings in Appendix C) will grade separate SR 347 and the UPRR tracks by depressing SR 347 and constructing a bridge to carry the railroad over SR 347 and an adjacent structure to carry the maintenance road. The maintenance road is shown on the north side of the tracks because of the additional right-of-way width, but a final determination of its location has not been agreed upon by UPRR. The proposed railroad and maintenance road bridges are a two-span underpass with a center pier in the median of SR 347. Full height abutments should be considered to minimize the span length and structure depth for railroad loading. The resulting span lengths are approximately 70’.

This alternative will require a dual track shoofly to detour the Union Pacific Railroad in order to maintain rail service during construction of the bridge structure. The shoo-fly is shown to the south of the existing track. The existing track, one of the main east-west lines for UPRR, has an operating speed of 70 mph, and UPRR will require the shoofly be designed to the same 70 mph speed limit. Consideration should be given to offsetting the shoofly a sufficient distance (approximately 50 feet) from the edge of the new structure to allow for shoring to build the bridge abutments and wingwalls.

As a result of the need for a railroad shoo-fly, UPRR right-of-way leasing, and need to relocate buried utilities under the UPRR, the SR 347-under option is estimated to cost more than the over option, as follows:

Table 4-2 SR347 Under the UPRR – Increase in Project Costs	
Construction of the UPRR shoofly – which will be a double-track shoofly:	\$5.0 million
Lease of UPRR right-of-way for placement of the shoofly	\$1.0 million
Additional utility relocations required	\$0.2 million
Pump station, for draining the depressed roadway area	\$1.0 million
Total Increase to Project Cost	\$7.2 million
In addition to the above project costs, the “SR347 Under” option presents the following impacts and life-cycle costs: <ul style="list-style-type: none">- pump station operating costs- relocation of the Amtrak Station	

The advantages and disadvantages of the under option are summarized in the following table:

Table 4-3 SR 347 Under UPRR

Advantages:	Disadvantages
<ul style="list-style-type: none">- Less ROW impacts- Least impacts to the community- Least project footprint- RR sight impacts	<ul style="list-style-type: none">- Drainage facilities- Additional temporary track relocation cost- Accommodating utilities- Less flexibility for roadway expansion

4.9.2 UPRR Grade Separation Over vs. Under – Findings and Recommendations

Findings:

- Constructing SR 347 under the UPRR appears to be viable for project Options 2, 3 and 5.
- Constructing SR 347 under the UPRR will increase project costs by \$5-10 million, or 10 to 20% of total project costs.
- Constructing SR 347 under the UPRR will have a net positive impact (or avoided negative impacts) for the community / project area, primarily by reduced visual and noise impacts.
- Constructing SR 347 under the UPRR may delay project implementation due to additional time for review and approval of the concept and designs by the UPRR, and additional time for construction of the shoofly tracks for the trains.
- Tunneling may be a viable option to cut-and-cover for constructing the SR 347 under the UPRR. However, tunneling will require additional coordination with the UPRR, as tunneling under an active railroad line is not commonly accepted. There is no guarantee that the UPRR will accept the tunneling option without considerable time and expense.

Recommendations:

Continue carrying the SR347-under as an alternative for Options 2, 3 and 5, until costs and benefits can be better defined.

Alternatively, the project owners – the City of Maricopa and ADOT – may decide that even at the least cost expected, say \$5 million, it is not worth the time and expense of depressing SR 347 under the UPRR.

4.10 Alternatives Considered and Eliminated

The complete compilation of the alternatives presented at the Concepts Workshop – and subsequently eliminated from further consideration is included in Appendix D. These concepts were eliminated for a variety of reasons including the following:

- Provided inadequate capacity for critical roadways in the project area.
- Provided too much capacity for the roadways compared to probable project costs and impacts (e.g. “interchange” concepts).
- Resulted in too much out-of-direction travel.
- Were similar to other concepts which provided as good or better benefits at a lower cost.

4.11 Evaluation Criteria

Options 1-5 were evaluated per the following criteria:

- Phase-ability (that is, can the option be implemented in phases)
- Costs (engineering, construction, right-of-way)
- Right-of-way impacts
- Railroad impacts (permitting and schedule)
- Utility impacts
- Traffic circulation
- Capacity

Note that all of these criteria are applied to the SR 347-over-the-UPRR option; the over versus under decision is recommended as a separate evaluation, applying only to Option 2, 3 and 5.

4.12 Evaluation Matrix

Evaluation Criteria	Unit of Measure	Option 1	Option 2	Option 3	Option 4	Option 5
Phasing of Improvements						
Overall Phasability of Improvements	Relative ability to implement individual elements in phases (construction packages) as traffic demand increases and/or funding is available	O	●	●	O	⊖
Cost Est. (in million \$)						
Construction and Design Cost	Planning-level estimated cost	\$63	\$50	\$50	\$67	\$93
Right-of-Way Cost	Planning-level estimated right-of-way cost	\$19	\$12	\$13	\$19	\$20
Total Cost (\$)		\$82	\$62	\$63	\$86	\$113
Total Cost (Rank)		⊖	●	●	O	O
Right-of-Way						
Required Right-of-Way (acres)	Planning-Level estimated right-of-way required	37.3	24.5	25.5	38.4	40
	Ranking	O	●	⊖	O	O
Affected Residential Parcels not adjacent to SR 347 (number)	Planning-Level estimated number of residential properties required	21	3	17	30	0
Affected Commercial Parcels not adjacent to SR 347 (number)	Planning-Level estimated number of commercial properties required	9	2	5	19	5

Evaluation Criteria	Unit of Measure	Option 1	Option 2	Option 3	Option 4	Option 5
Affected Public Parcels not adjacent to SR 347 (Number)	Planning-Level estimated number of public properties required	1	1	1	0	0
	Ranking	⊖	●	⊖	○	●
Railroad Effects						
Project Permitting and Schedule	Anticipated time needed for UPRR review and approval	⊖	⊖	⊖	⊖	⊖
Overhead Utility Effects	No differences between the alternatives					
Underground Utility/Irrigation Effects	No differences between the alternatives					
Traffic Circulation and Access Effects	Relative loss / modification of access to businesses improvements	●	⊖	○	○	⊖
Traffic Operations/ Capacity						
Vehicle Miles of Travel	miles	452,993	456,801	456,094	450,361	446,614
Vehicle Hours of travel	hours	11,780	12,061	12,010	11,813	11,619
Average Operation Speed	miles per hour	38.5	37.9	38	38.1	38.4
Total Delay	vehicle hours	588	801	773	715	673
	Ranking	●	○	⊖	⊖	●



Good



Fair



Poor

Evaluation Criteria	Unit of Measure	Option 1	Option 2	Option 3	Option 4	Option 5
Environmental Effects						
Visual	Relative visual obtrusiveness	⊖	⊖	⊖	⦿	⊖
Hazardous Materials	Relative amount of suspected hazardous material sites that may be affected	⊖	●	●	⊖	●
Clean Water Act Section 404/401	No differences between alternatives					
Vegetation/Habitat	Relative amount of natural vegetation/habitat that would be disturbed	⊖	⊖	●	●	●
Traffic Noise	Relative traffic noise impacts to nearest residential/commercial properties improvements	⦿	⊖	⊖	⊖	⊖
Cultural Resources	Relative disturbance to archaeological and cultural resources improvements	⊖	⊖	⊖	⦿	●
	Relative impact to minority, low income, or other populations protected by federal law or executive order of improvements	⦿	●	⊖	⦿	●
Alternative Transportation Mode Effects						
Provisions for pedestrians / bicyclists	Relative amount of infrastructure for pedestrian and bicycle facilities provided	⦿	●	●	⦿	⊖
Drainage Effects	No differences between the alternatives					

Evaluation Criteria	Unit of Measure	Option 1	Option 2	Option 3	Option 4	Option 5
Traffic Safety and Security Effects						
Access improvements for School / Fire / Police	Relative improvement in access and response times for School / Fire / Police	⦿	⊖	⊖	⦿	●
Constructability						
	Anticipated complexity of construction	⊖	●	●	⦿	⊖
Maintenance						
	Relative maintenance costs	●	●	●	⦿	●
Total Ranking of Alternatives		⊖	●	⊖	⦿	⊖

●

⊖

⦿

Good

Fair

Poor

SECTION 5

Environmental Overview For State Route 347 and the Union Pacific Railroad Grade Separation

Table of Contents

5.0 Introduction..... 3

5.1 Affected Environment..... 3

5.1.1 Physical and Natural Environment 3

1. Topography/physiology 3

2. Vegetation 3

3. Biology..... 3

4. Hydrology (floodplains, water quality)..... 3

5. Noise (receptors)..... 3

6. Air Quality (attainment/non-attainment) 3

7. Hazardous Materials (PISA) 3

8. Section 4(f)..... 4

9. Prime and Unique Farmlands..... 4

5.1.2 Socioeconomic Environment 4

1. Land Use 4

2. Socioeconomics 4

3. Environmental Justice 4

4. Title VI..... 5

5. Right-of-Way 5

6. Utilities..... 5

5.1.3 Cultural Resources (records/lit review) 5

5.2 Environmental Concerns..... 5

5.2.1 Physical and Natural Environment 5

1. Land Form..... 5

2. Sensitive Species..... 5

3. Water Quality 5

4. Noise 5

5. Hazardous Materials 6

6. Section 4(f)..... 6

7. Prime and Unique Farmlands..... 6

5.2.2 Socioeconomic 6

1. Relocations..... 6

2. Land-Use Change..... 6

3. Title VI/Environmental Justice 6

4. R/W Acquisitions..... 6

5. Utilities..... 6

6. Neighborhood/Community 6

5.2.3 Cultural Resources 6

5.3 Conclusion 6

5.4 Consultation/Coordination..... 7

5.4.1 Coordination 7

5.4.2 Public Involvement 8

5.0 INTRODUCTION

The City of Maricopa is located approximately 35 miles south of Phoenix and 20 miles northwest of Casa Grande (Figure 1-1 State Map; Figure 1-2 Vicinity Map). The City of Maricopa developed originally as a farm community with service industries and agricultural production located around the intersection of State Route 347 (SR 347) and the Maricopa-Casa Grande Highway.

This environmental overview is intended to describe the social, economic, and environmental character of the study area; identify potential obstacles and issues associated with the study area; and evaluate the study area alternatives at a conceptual level for the grade separation of SR 347 and the Union Pacific Railroad (UPRR) tracks as well as the realignment of the intersection of SR 347 and the Maricopa-Casa Grande Highway. Improvements to the Maricopa-Casa Grande Highway are being considered as well because either grade separation option may necessitate realignment of a portion of the Maricopa-Casa Grande Highway.

From Maricopa, SR 347 provides access to the Phoenix metropolitan area to the north and Harrah’s Ak-Chin Casino to the south. The Maricopa-Casa Grande Highway provides access from Maricopa to Casa Grande to the southeast, and SR 238 provides access to Mobile to the west.

The purpose of the study is to identify long-term, cost-effective transportation solutions that improve mobility in and through the community. The study is needed because the City of Maricopa is growing at a rate that will overwhelm the transportation system. Maricopa’s population has tripled in less than two years and grown at an average rate of 83.2% a year over the past 22 months.

5.1 Affected Environment

5.1.1 Physical and Natural Environment

1. Topography/physiology

The City of Maricopa is located within the Sonoran Desert on flat terrain at an elevation of about 1,200 feet. The predominant native vegetation for the area is Lower Colorado River Sonoran Desert Scrub.

2. Vegetation

Native vegetation is sparse due to the highly developed nature of the project area. Historically, areas in the vicinity of the project area were used intensively for agriculture.

3. Biology

There are no listed threatened or endangered species associated with this project. The project area does not occur within proposed or designated critical habitat. However, the Western Burrowing Owl, a species of special concern in Arizona, is federally protected and known to occur in the project vicinity; therefore, a field review for the species is needed prior to any ground disturbing activities. Western Burrowing Owls prefer agricultural fields, canal banks, vacant lots and desert grassland and open space near commercial buildings. While a survey may determine that the Western Burrowing Owl is absent from the project limits, they could colonize the area prior to ground disturbing activities; therefore a survey for the species prior to these activities is needed.

The Arizona Game and Fish Department (AGFD) has not identified wildlife movement corridors within the project limits; however future coordination with the AGFD could help identify ways to improve design elements, such as drainage culverts, for wildlife connectivity.

4. Hydrology (floodplains, water quality)

The project is not within a 100-year floodplain as delineated by the Federal Emergency Management Agency. However, an unnamed wash located about 400 feet south of the intersection of SR 347 and the UPRR tracks runs approximately parallel with the UPRR tracks. Therefore, Clean Water Act Section 404 permitting will need to be further evaluated as the project develops.

5. Noise (receptors)

The project would change the alignment of SR 347 at the UPRR tracks and will require a noise analysis during the future design phase of the project. There are multiple residents and other sensitive receivers in the vicinity of the grade separation. The nearest residential properties are approximately 400 feet northeast and 800 feet northwest of the proposed grade separation. A high school and middle school are located approximately 900 feet southwest of the proposed grade separation. Commercial properties are located in all four quadrants immediately adjacent to the proposed grade separation.

If the grade separation is elevated above the tracks, noise levels associated with the roadway are expected to increase. However, either of the grade separation options, overpass or underpass, will eliminate the need for trains to blow their whistle as they pass through the area. Currently, between 45 and 55 freight trains travel through Maricopa daily. The number of daily trains is expected to increase to 60 by the year 2013, and plans are underway to add a second track at this location, allowing for further increases in train traffic. Trains that stop and start at the Amtrak train station are required to blow their whistle upon arrival and departure; therefore this contribution to the ambient noise levels will continue. Amtrak has two stops in Maricopa three days per week. The eastbound train arrives late at night and westbound train arrives early in the morning.

6. Air Quality (attainment/non-attainment)

The project is located in an area that complies with all national ambient air quality standards. Therefore, conformity procedures do not apply to this project. This project will have no negative effect on the air quality in the area. In addition, reducing the congestion at the rail crossing should improve air quality. Depending on the extent of improvements proposed and the projected traffic volume, a qualitative or quantitative mobile source air toxic analysis may be required.

7. Hazardous Materials (PISA)

A Preliminary Initial Site Assessment (PISA) was performed for the project. Land use in the immediate vicinity of the project area consists of SR 347, graded and paved streets, UPRR lines, an Amtrak train station, service stations, an auto wrecking yard, commercial retail establishments, an iron fabrication shop, private residential housing, schools, and vacant/undeveloped land.

A total of three current service stations and three historic service stations are located in the project area. One of the historic service stations, Site A, Bullshippers Service #414 is identified as having a known impact to groundwater. A groundwater monitoring well was noted at the northwest corner of the crossing of SR 347 and the UPRR.

An auto wrecking yard that does not appear to be in operation and an iron fabrication shop are located within the project area. A summary of listed sites is presented in Table 1.

Table 1. Listed Sites

Site Name/(Former Name)	Address	Site Operations	Risk of Potential Impact to Project
Bullshippers Service #414	19282 N. John Wayne Parkway	Known soil and groundwater contamination	High
Savco #9	19395 N. John Wayne Parkway	Known soil contamination	High
Trejo Oil Company	19568 N. John Wayne Parkway	Known soil contamination	High
Express Stop #509	19590 N. John Wayne Parkway	Service station with underground storage tanks	High
Texaco – Food Mart /(Shell)	19680 N. John Wayne Parkway	Service station with underground storage tanks	High
Circle K Store	19864 N. Maricopa Rd.	Service station with underground storage tank	High
Maricopa Building Supplies	19241 N. Maricopa Rd.	Metal fabrication	Medium
Unknown	West of the SR347 & UPRR crossing	Auto wrecking yard	Medium

8. Section 4(f)

Two undocumented historic resources in the study area are the historic alignment of the Southern Pacific Railroad’s original transcontinental Sunset Route (AZ:2:40 [ASM]) and the Maricopa Depot water tower. The historic alignment is located along the current alignment of the tracks. The water tower is associated with the railroad west of SR 347 on the north side of the railroad tracks.

The Southern Pacific Sunset Route, now owned by the UPRR, has been determined eligible to the National Register of Historic Places for its association with the early development of railroads in Arizona and settlement of the West. The eligibility of individual segments across the state has been evaluated as contributing or non-contributing. The segment through the current study area has not been evaluated.

The Maricopa Depot water tower was constructed ca. 1897 and represents one of the last remaining structures of its type along the Sunset Route in Arizona. The tower has not been formally recorded; however, through Section 106 consultation for a previous enhancement project, the SHPO concurred with ADOT’s recommendation that the water tower is eligible for the National Register of Historic Places under Criterion C for its architectural significance.

Three additional resources that will need evaluation as 4(f) resources are the Big Red Barn on the southwest corner of SR 347 and UPRR and the Rotary Park and Pool at 44236 West Maricopa-Casa Grande Highway, which is approximately 2000 feet east of SR 347; and the Maricopa Schools complex on the northwest corner of SR 347 and Honeycutt Avenue. One of the comments received during the public scoping identified the Big Red Barn as a historic building that may date to the 1870’s. The park and school complex were noted during a field review.

9. Prime and Unique Farmlands

Farmland is located in the southeast quadrant of the project area. Further review of soil maps for Pinal County is needed to determine if the farmland is prime and unique farmland; however, much of this land has been platted for development. Platted agricultural lands may not be protected under the Farmland Protection Policy Act (7 CFR Part 658).

5.1.2 Socioeconomic Environment

1. Land Use

The project area consists of commercial, agricultural, transportation, and residential uses. Residential is the fastest growing use.

Older residential areas are located in the northeast and northwest quadrants of the project area. A newer residential area is located approximately 900 feet northeast of the SR 347 and UPRR crossing. A middle school and high school are located southwest of the SR 347 and UPRR crossing. Commercial properties are located along SR 347 throughout the project limits.

2. Socioeconomics

The total population for Maricopa, as tabulated by the December 2005 Special Census, is 15,934 residents. Maricopa is a young community with 42% of the residents between the ages of 25 and 44. The average household size is 2.7 persons and 14% of the homes are occupied by adults living alone, mostly young professionals.

Most residents are in non-farming industries such as Harrah’s Ak-Chin Casino or commute to places of employment in nearby Casa Grande or Phoenix.

3. Environmental Justice

“Executive Order 12898” on environmental justice directs that programs, policies, and activities not have a disproportionately high and adverse human health or environmental effect on minority and low-income populations. To determine if the project has the potential to involve environmental justice issues, the project impacts were evaluated in relationship to existing land use characteristics and the Census Bureau data for the project area and vicinity.

According to 2000 Census Bureau data, the percentage of minorities within the census blocks surrounding the project area approached 50% and was higher than that for the State of Arizona, 25%, and Pinal County, 30%.

4. Title VI

Federal poverty thresholds vary by household size. The Department of Health and Human Services poverty guidelines state that the poverty level for a family of four in 2005 is \$19,350. It is important to note that the poverty thresholds are the same for all parts of the country – they are not adjusted for regional, state, or local variations in the cost of living. According to 1999 Census Bureau data, the population percentage for low-income families is 19% for the Maricopa census tract 17, which includes the study area. This is higher than the percentage for the state of Arizona, 10%, and Pinal County, 12%.

Interestingly, the minority population for Maricopa has decreased with each census since 2000, as demonstrated by the Special Censuses of 2004 and 2005. This may be due to the influx of new residents to Maricopa.

5. Right-of-Way

Currently, five design options are being evaluated. All of the options require the acquisition of R/W and easements from both commercial and residential properties. In addition, temporary construction easements will be required and agreements regarding R/W will be needed from the UPRR.

6. Utilities

There are multiple utilities in the area that will require coordination. Overhead power lines are located along Honeycutt Road (Arizona Public Service), buried petroleum product lines are located along both sides of the UPRR R/W, water and sewer lines are located in the roadways throughout the project area (City owned or privately owned and under contract to the City), and fiber optic lines, particularly within the UPRR R/W (Qwest and others).

The UPRR tracks parallel the Maricopa-Casa Grande Highway within the project area. Amtrak operates three days per week in each direction and UPRR operates trains daily through Maricopa. The Amtrak trains are typically longer than the station platform and while passengers board and disembark the train, traffic on SR 347 can be blocked for up to 15 minutes.

5.1.3 Cultural Resources (records/lit review)

A Class I records check indicated that 14 cultural resource surveys have been conducted in the study area and that three archaeological sites (AZ T:16:2 [ASM], AZ T:16:21 [ASM], AZ T:16:118 [ASM]) and one historic road alignment (AZ T:16:130 [ASM]) have been previously documented.

AZ T:16:2 (ASM) was recorded in 1955 on the southeast side of the intersection of SR 347 and the Maricopa-Casa Grande Highway. The site was an artifact scatter. The area was resurveyed in 1989 and 1992; neither survey detected a site at this location.

AZ T:16:21 (ASM) was originally recorded in 1969 about 0.5 mile southwest of the SR 347 railroad crossing. The site is multi-component with prehistoric Hohokam and historic O’odham occupations. The portion of the site within the current study area was rerecorded in 2002. The site is considered eligible to the National Register for its information potential.

AZ T:16:118 (ASM) was recorded in 1992 about 0.5 mile west of SR 347 on the south side of the Union Pacific railroad tracks. The site is a scatter of prehistoric and historic artifacts. The site was not evaluated for National Register eligibility.

AZ T:16:130 (ASM) was documented in 2000 and is the historic alignment of Maricopa Road, now designated SR 347. However, SR 347 has been modernized and upgraded to the point that none of its historic qualities remain (Courtwright 2000). According to AZSITE, the SHPO concurred that the site is not eligible for the National Register of Historic Places due to a lack of integrity.

Two undocumented historic resources in the study area are the historic alignment of the Southern Pacific Railroad’s original transcontinental Sunset Route (AZ:2:40 [ASM]) and the Maricopa Depot water tower. The historic alignment is located along the current alignment of the tracks. The water tower is associated with the railroad west of SR 347 on the north side of the railroad tracks.

The Southern Pacific Sunset Route, now owned by the Union Pacific Railroad, has been determined eligible to the National Register of Historic Places for its association with the early development of railroads in Arizona and settlement of the West. The eligibility of individual segments across the state has been evaluated as contributing or non-contributing. The segment through the current study area has not been evaluated.

5.2 Environmental Concerns

5.2.1 Physical and Natural Environment

1. Land Form

The terrain in the project area is relatively flat. If selected, the overpass would have a more predominant visual presence than the underpass.

2. Sensitive Species

Surveys for Burrowing Owl will be needed prior to construction due to the presence of potential habitat in the project area.

3. Water Quality

This project may require a Clean Water Act Section 404 permit. Soil disturbances are anticipated to be greater than one acre; therefore the project will require a Storm Water Pollution Prevention Plan.

4. Noise

There are multiple residents and other sensitive receivers (schools) near the proposed grade separation. The proposed project would change the vertical and horizontal alignment of SR 347 at the UPRR tracks and, therefore, a noise analysis during the preliminary design phase would be required.

Although a traffic noise modeling analysis would be performed for this project, it is important also that the noise study discuss the reduction in train whistles that would result from the proposed grade separation.

Grade separating the UPRR/SR347 intersection would eliminate the approximately 50 through-train whistles daily. Although trains that start and stop at the Amtrak station would be required to blow their whistle upon arrival and departure, this would produce only 12 train whistles per week. Therefore, upon completion of construction, grade separating the UPRR/SR347 intersection would reduce existing train whistles by nearly 97 percent.

5. Hazardous Materials

The amount of subsurface disturbance associated with the project is expected to be high. Based on the results of the PISA, a more detailed investigation for hazardous materials (Initial Site Assessment) is recommended once a preferred corridor is identified.

6. Section 4(f)

The historic Southern Pacific water tower is in close proximity to the current SR 347 railroad crossing and will require particular attention during the planning process. The Red Barn was noted by members of the public as a potential historic resource. Rotary Park and Pool at 44236 West Maricopa-Casa Grande Highway is approximately 2000 feet east of SR 347. These potential 4(f) resources will require additional research and documentation during the design phase of the project.

7. Prime and Unique Farmlands

A review of the assessor’s records for Pinal County indicates that the majority of the agricultural property in the project area has been platted for residential development. The Desert Cedars subdivision is platted for the western portion of the agricultural land and the Santa Rosa Crossings subdivision is platted for the eastern portion of the agricultural land. Platted lands may not be protected by the Farmland Protection Policy Act (7 CFR Part 658). The portions that are not platted, but are impacted by roadway improvements that are federally funded will need further review.

5.2.2 Socioeconomic

1. Relocations

The area in the vicinity of SR 347 and the UPRR crossing has both commercial and residential properties. Multiple properties will need to be acquired under all of the alternatives for transportation improvements. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (42 U.S.C. 4601) and ADOT’s relocation program and relocation advisory assistance program, which satisfies the requirements of Title VI of the Civil Rights Act, will be followed to ensure adequate consideration and compensation for the person whose property is required for the project.

2. Land-Use Change

The City of Maricopa is growing rapidly. Land use in the vicinity of the project is being converted to residential housing at a rate that will soon overwhelm the existing transportation network. The agricultural field southeast of the project is platted for residential development. The conversion of land to residential use will occur with or without improvements to the transportation network; however, improvements to the network are vital to the sustainability of the community.

3. Title VI/Environmental Justice

Additional public involvement and consideration of potential Title VI and Environmental Justice populations will be needed as the alternatives are further developed and refined. The City of Maricopa developed around the intersection of SR 347 and Maricopa-Casa Grande Highway; therefore this area is well established and transportation improvements may impact potential Title VI and Environmental Justice populations.

4. R/W Acquisitions

Both commercial and residential properties will be affected by either grade separation option. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (42 U.S.C. 4601) and ADOT’s relocation program will be followed as stated in the chapter regarding Relocations to ensure adequate consideration and compensation for the person from whom property is being acquired.

5. Utilities

Further investigation during the design phase is needed to evaluate specific utility involvement.

6. Neighborhood/Community

All of the alternatives under consideration would modify access within the study area. While some options would require residents to travel a slightly longer distance to access either SR 347 or the Maricopa-Casa Grande Highway, they all maintain access to these facilities and improve mobility within the area. Mitigation measures such as traffic lights, noise walls, and sidewalks may be necessary to minimize neighborhood and community impacts.

5.2.3 Cultural Resources

While the SR 347 R/W through the study area has been previously surveyed for cultural resources with negative results, coverage of adjacent areas along the highway is incomplete. Based on the results of previous surveys in the vicinity and given the town of Maricopa’s historical roots and associations with the Southern Pacific Railroad, there is a potential for previously undocumented prehistoric and historic cultural resources to exist in the study area. Cultural resource surveys, architectural assessments and tribal consultation should be conducted as needed to determine the effects of the planned grade separation project on potentially historic properties. Any properties determined eligible to the National Register that would be adversely affected by the undertaking would require an appropriate form of mitigation.

5.3 Conclusion

This report identifies environmental issues that will need additional analysis as the project progresses to design. The need for additional studies was identified for sensitive species, potential jurisdictional waters, traffic noise, hazardous materials, Section 4(f) resources, Title VI and Environmental Justice populations, R/W and temporary easement needs, utility relocations and coordination, and cultural resource documentation. These studies are anticipated to occur during the design phase of the project.

The magnitude of project improvements and the potential impacts to the social, environmental, and economic conditions of the study area suggest that an environmental assessment would be the appropriate level of environmental documentation for the proposed project improvements.

5.4 Consultation/Coordination

5.4.1 Coordination

An agency scoping meeting was held on June 7, 2006 at the City of Maricopa Public Works Yard. Attendees represented: Ak-Chin Indian Community, Amtrak, Bureau of Indian Affairs, Federal Highway Administration, ADOT, Pinal County Public Works Department, Arizona Department of Public Safety, Maricopa Fire Chief, and City of Maricopa. Issues raised and comments made at the scoping meeting included:

- It typically takes 18-24 months for UPRR to have maintenance agreement with ADOT.
- Once the UPRR-ADOT maintenance agreement is agreed, it typically takes AZ Corp Commission - 3-4 months for approval.
- For an agreement with UPRR, the project "footprint" (approximately 30% plans) - and requirements of UPRR will be needed, including construction estimate, and right-of-way (R/W) easement exhibit.
- For state (ADOT) projects, all submittals to the UPRR need to be through ADOT Utilities and Railroad (U&RR) Section.
- Project team needs to provide project schedule to involved agencies, when available.
- It will be important to maintain traffic along and access to the Maricopa-Casa Grande (M-CG) Highway throughout construction.
- There are no good, convenient alternatives available for detouring north-south traffic from SR 347.
- Need to consider access throughout for the fire department, as they already have difficulties in getting in and out of their station and onto SR 347. Fire Station #1 may have to be relocated.
- New fire station (Alterra) will be operating south of UPRR, and the fire department needs to support both fire stations.
- Project will need to provide a shoofly (temporary detour or reroute) for any disruption of UPRR operations, or relocation of their tracks.
- City of Maricopa Police Department and Pinal County Sheriff's Office need to maintain reasonable response times, especially during construction with the detours. Detours typically increase response times, and may result in more congestion and accidents.
- Consultant should conduct a traffic analysis to determine if having one lane open in each direction will be feasible - and adequate - during construction.
- Consultant should look into a possible 3-lane detour with a reversible center lane.
- Some residents located south and east of the City Hall area may not be in favor of nighttime construction.
- Ak-Chin and the City of Maricopa are planning a new commercial development center along SR 347 south of UPRR.
- Ak-Chin (government operations and the casino) employs over 1000 people, with roughly 80% being from the Phoenix Area.
- Over 3 million people visit the casino annually. Most of these people also come from the north, along SR 347.
- There is significant other development along SR 347 south of the Ak-Chin Indian Community, including the Stanfield area. Most of those residents work in the Phoenix area.
- The grade separation needs to be at least 6-lanes and perhaps expandable to 8-lanes.

- Consultant should look into elevating the UPRR over SR 347. This will have fewer utility impacts, less local road impact, and may reduce noise from the UPRR. It was mentioned that the maximum grade for the railroad would be 1% and the tracks are at 0.8% grade currently.
- If UPRR is not elevated over SR 347, consider "splitting the difference", i.e. raising the UPRR some, and lowering SR 347 some.
- A question was raised as to the width of the existing UPRR R/W. The UPRR R/W is 375 feet in width.
- All reasonable options need to be discussed in the Feasibility Report, with explanations on why some were not pursued further. New alignments or new roadways east and west of the current alignment should be considered.
- If SR 347 mainlines are relocated away from the existing SR 347 alignment, it might be possible to retain the existing at-grade crossing as a local street, for local traffic only. Note that the UPRR will not contribute funding for the project unless the at-grade crossing is completely eliminated.
- AMTRAK needs to maintain access to their existing station, or possibly relocate the station. A question was raised if AMTRAK was studying relocating the station to Phoenix. AMTRAK is not studying this issue, but UPRR may be.
- AMTRAK is also very open to relocating platform to the southeast, within reasonable walking distance of the station.
- The project needs to investigate / assess the local / historic characteristics of the proposed "Old Town Redevelopment" area.
- Project also needs to be aware of "4(f)" properties, e.g. the School.
- Project also needs to consider impacts to and possible relocation of businesses and residences in the area, as part of the environmental overview process.
- Project also needs to consider noise receptors in the area, and possible mitigations.
- The Maricopa City Council is concerned about the visual impact of going over the tracks.
- ED3 has a 69kv line at Honeycutt Road.
- If the UPRR is elevated over SR 347, it might reduce noise from the UPRR.
- Elevating the UPRR would allow traffic circulation below the railroad.
- If the at-grade crossing is eliminated, then there will be fewer train whistles (noise) in the community. But AMTRAK will still need to blow whistle when stopping / starting.
- Project / City may want to consider relocating all emergency services (police, fire, ambulance) to one location with a signal and pre-emption.
- The SR 347 project will need to be closely coordinated with the M-CG project to maintain routes for emergency services.
- City may consider expediting construction of other grade separations (east of SR 347, along the Maricopa-Casa Grande Highway) so that these may be used as a detour route while the SR 347 grade separation gets constructed.
- The City of Maricopa reemphasized the importance of this project to the community.
- Project team needs to make sure that obtaining permits, e.g. for geotech drilling and surveys, are considered in the project schedule.
- Project team needs to keep FHWA informed on the environmental process to make sure that project qualifications are met for federal money.

Project team representatives attended the regularly scheduled community meeting at the Ak-Chin Community Center on June 28, 2006 to give a brief presentation. Approximately 25 Ak-Chin Community members were in attendance. In general, the community was in support of the project and would like to see it move forward quickly. The meeting notes are in Appendix F. The following highlights the comments and questions received:

- Will UPRR double track?
- Will the Ak-Chin have the opportunity to review the R/W information?
- Would like an opportunity to review and approve traffic control plans as work on SR 347 affects access to the Ak-Chin Casino.
- Could developers construct a toll road?
- Emergency services are impeded by the Amtrak train and the railroad.
- Will the intersection of SR 347 and Maricopa-Casa Grande Highway be reconfigured if an overpass is constructed?
- What are the widening plans for SR 347?

In addition to the meetings described earlier, coordination letters were sent to the Arizona Game and Fish Department; the Ak-Chin Indian Community's Environmental Protection Department; the Ak-Chin Indian Community's Manager of Cultural Resources Office, and the Gila River Indian Community's Council Secretary's Office on June 30, 2006.

The Arizona Game and Fish Department responded with a letter (see Appendix F) which stated that a special status species, the Western Burrowing Owl, have been documented as occurring in the project vicinity. They also expressed an interest in continuing coordination efforts as the project proceeds.

Ak-Chin responded by telephone that formal consultation would be done government agency to government agency; however, there were no sites or traditional cultural properties in the vicinity of the project area. Although the area was heavily occupied 2,000 to 3,000 years ago, surface sites have been eliminated by development. The potential for subsurface artifacts always exists. In general, the Ak-Chin Indian Community supports the project.

5.4.2 Public Involvement

The public has been actively involved in this project. Two public meetings were held at Maricopa High School. The first on June 28, 2006 from 6 to 8 p.m. and the second on October 25, 2006 from 6:30 to 8:30 p.m.. Each of these public meetings are described below. Two meetings were also held with the Ak-Chin Indian Community.

The June meeting introduced both the SR 347 / Union Pacific Railroad (UPRR) grade separation and the Maricopa-Casa Grande Highway project. Approximately 45 members of the public attended the meeting, of which at least two were reporters. The sign-in sheet for this meeting may be found in Appendix F.

Overall, the comments reflected support for the project. Eight completed comment forms and 53 comment cards were submitted. The suggestions were grouped and summarized below, but copies of the comment forms may be found in Appendix F. The following highlights the comments received by members of the public:

- Need a toll road through the Gila River Indian Community

- Existing roadway surface in and out of town is in poor condition
- Existing roadway is unsafe because of high speeds, narrow width, and lack of patrols
- Consider reducing speeds through Maricopa
- Build a transit (rail) connection to Phoenix or request Amtrak service to Phoenix
- Build a truck bypass to handle increased truck traffic
- Consider "truck only" lanes
- Planning should encourage industry and business to locate in Maricopa
- Consider a Porter Road Bypass, north and south of the community
- Make the Maricopa-Casa Grande Highway a 4-way stop at Porter and let north south traffic use Porter to access Smith Enke to the north.
- Need a western crossing of the UPRR possibly near Green Road
- Request funding from the City of Phoenix, Pinal County, builders/developers, Gila River Indian Community
- Don't use steel in construction – too industrial in appearance
- How will traffic be accommodated during construction?
- Traffic control plans should be reviewed by Ak-Chin as well as the City
- Project should not affect Ak-Chin's boundaries
- Bridge the low water crossings at Val Vista Wash
- Consider drainage in design, don't assume sheet flow to the Ak-Chin reservation
- Create a loop freeway to connect to Phoenix
- Develop a bypass around Maricopa
- Project should create two crossings of the UPRR with sufficient spacing such that a train derailment would not block both crossings
- Eliminate the "s" curves south of the UPRR
- Create a beltway through the city
- Consider connections between SR 347 and I-10
- Work with the Indian communities on either side of the project
- Need to look at access to and from other communities
- Move the Amtrak station away from SR 347
- Install additional traffic lights and lighting
- Concerned about impacts to electrical substations
- Build at least 4 lanes and probably 6 lanes
- Consider impacts to properties near construction
- Accelerate the projects to cope with growth
- Construct the quickest and cheapest grade separation of the UPRR
- Emergency services need the ability to cross the RR tracks at all times
- Incorporate a local focus
- Provide art treatments
- Move local taverns away from major traffic areas
- Work to gain cooperation of state and federal agencies
- Create a project Web site
- Consider safety in the design
- Plan for access during construction

- Build an alternate road out of the city in case of emergency
- Consider federal funding for hazardous material sites
- Construct an underpass it would be more aesthetically pleasing and worth the extra money
- Construct an overpass
- Bypass ADOT's involvement by creating a grade separation at another location
- Avoid the Big Red Barn it could date to the early establishment of the town
- Move SR 347 outside the boundaries of the Ak-Chin reservation
- Reroute entrance to Maricopa from the Maricopa-Casa Grande Highway to Honeycutt Road

Approximately 25 members of the public attended the October public meeting. The purpose of this meeting was to introduce the public to the preliminary alternatives and to solicit comments and questions on these alternatives. An overview of the project including project goals, issues and challenges was presented. The five options under consideration for the roadway were presented and explained. Questions and comments included:

- It looks like quite a lot of traffic is expected. Is there an option for a freeway?
- Are there other ideas for north-south travel? It looks like there would be a combined 60,000 vehicles at some intersections. We need a more coordinated plan.
- Options 2 and 5 are better because they don't split the traffic.
- How does ADOT right-of-way purchasing work? Will they just take what they need and leave behind segments of property? What about at our church – they have already purchased some of that land?
- Who makes the decision on which option is used? How is the decision made? Which criteria are used?
- When will we know where it will go? (Response: About 6 months of study, then 1-1 ½ years for design. Best case scenario, we would know in about a year.)
- Regardless of the choice, not everyone will be happy. We need to look at what is best for the most people.
- What about unexpected consequences such as noise?
- Is there a possibility of the railroad going over the road?
- Why not use the existing SR 347 alignment?
- Where will traffic go during construction?
- What will happen to the existing SR 347 if the new roadway is moved to the south, specifically the area south of Honeycutt?
- How far north will the new construction go?
- Which option gives the shortest travel time from the south end to the north? (Response: The option with the fewest major intersections will give shortest travel time. Option 4 would be the best, because there aren't any intersections and it is a free flow of traffic. Option 5 would be the worst.)
- Which option splits traffic off from 347 best? (Response: Option 5 probably does best at taking the most people off the road and giving them alternatives. Option 1 is probably best because there is more distance between intersections.)
- Which is the safest? (Response: The options with the greatest space between intersections will be the safest.)
- Which would function best if there was an accident? (Response: Option 2 provides spacing between intersections and offers drivers redundancy.)
- Which is the cheapest? (Response: Probably Option 2.)
- How is this financed?

- Would more federal funding make it a more stringent process?
- Would a future third railroad line affect the design?
- How about relocating the Amtrak facility east or west?
- In Option 2, does Edison cross the tracks?
- There is currently a problem with weeds in the median of 347. Also, rocks get kicked up and there are a lot of broken windshields as a result.

Eleven comment sheets were submitted by the public and one e-mail comment was submitted (attached as Appendix F). Commenter's expressed preferences for different options by rating the options from 1 to 5 (1 being the best). Option 3 rated the highest with most first and second place ratings and no ratings above 3. Option 4 was the least acceptable to those who commented, followed by Options 1, 2, and 5. Concerns about the alternatives were mainly based on costs and changes and restrictions to local access. Regarding the biggest challenges that Maricopa residents and businesses will face with redesign and construction of SR 347, people mentioned relocations, loss of parking, loss of business revenue, safety during construction, and the need for detours and making these wide enough.

6.0 IMPLEMENTATION

6.1 Introduction

Regardless of the option selected for the SR347-UPRR Grade Separation project, implementation of the project will be a challenge – and an opportunity – to provide the community with the greatest benefits as early as possible, given schedule requirements and funding constraints. Following is a review of some of the goals to achieve during implementation planning, and constraints to be considered.

6.2 Implementation Goals

The primary goal of implementation planning should be to provide the community with as much project benefit as early as possible during the life of the project. This may be achieved by:

- Constructing “interim projects” which should be consistent with the long-term project.
- Fast-tracking the funding, planning, design, environmental, and UPRR processes, to avoid critical path issues as much as possible.
- Schedule implementation of various elements of the project to respond to stakeholder – and participant concerns and goals.

6.3 Schedule Considerations

Several aspects of this project include activities which, though necessary, tend to lengthen the project schedule. These activities include:

- Union Pacific Railroad reviews / permit approvals.
- NEPA Environmental Document Process.
- ADOT Project Development Process.
- Right-of-way acquisition.

UPRR Approvals: Construction of this project will require full approval of the UPRR. Since construction of the roadway overpass / underpass involves extensive heavy construction within UPRR right-of-way, and proximity to UPRR train operations, UPRR will review in detail the construction plans and specifications. Frequently these reviews result in discussions, revisions and resubmittal. Typical time for UPRR to review and approve a project like SR 347 grade separation: 12 to 18 months. (Note that this time could be increased considerably if the decision is made to construct SR 347 under the UPRR.)

NEPA Process: Based on the project environmental setting and options presented, it is likely that this project can be approved for construction under an Environmental Assessment (EA) process.

ADOT Project Development Process: ADOT, who will be a critical funding partner for this project, requires certain pre-design and design processes to be followed, as well as reviews of all documents including construction plans and specifications. Many of these processes are required by federal processes (e.g. NEPA), and they all take time. Typical times for ADOT processes for a project like SR 347-UPRR:

- o Design Concept Report: 12 months (can be done concurrently with EA)
- o Final Design: 12 to 15 months (including ADOT reviews)

Right-of-way acquisition: Per the ADOT process, parcels needed for roadway construction can take up to one year or more to acquire.

6.4 Funding Considerations

The SR 347-UPRR grade separation project would be a large, expensive project, and funding should come from a variety of stakeholders. These may include the following:

- City of Maricopa: The City would be the major beneficiary of this project, and should pay a significant portion of project costs. The City recognizes this fact, and has \$15 million programmed in their current Capital Improvement Plan (CIP) toward this project.
- ADOT / FHWA: Since SR 347 is an ADOT facility, ADOT will be another key contributor toward the project. In discussions, ADOT representatives at all levels have expressed support for the project; however, ADOT’s financial resources are very strained currently, as rapid growth is requiring major transportation upgrades throughout the state. Also, there is nothing programmed for this project in ADOT’s current 5-Year program.
- Union Pacific Railroad: The UPRR has a policy of supporting projects to eliminate grade separations. The railroad’s policy is to pay 5 percent of the “theoretical structure” cost for the project. The “theoretical structure” is defined as reconstruction of the existing roadway structure on a simple bridge over the railroad. It does not include any upgrades such as roadway widening. This reimbursement would be handled through a project agreement.
- Pinal County: Prior to incorporation by the City of Maricopa, the county collected transportation impact fees for many of the areas that would benefit from this project. These fees, presumably still held by the county, could go toward this project; the Maricopa-Casa Grande Highway, one of the key roadways to be improved by this project, was formerly a Pinal County highway.
- Ak-Chin Indian Community: The Ak-Chin, and especially the Harrah’s Ak-Chin Casino located on SR 347 less than two miles south of the UPRR crossing, would benefit from a grade separation with the UPRR. The majority of their casino customers and employees come from the north via SR 347.

No attempt to allocate project cost amongst contributors is made in this feasibility report. ADOT’s normal policy is to spend funding only on ADOT facilities, e.g. SR 347. Their contributions are typically limited at the back of curb return of existing intersections, and possibly limited side street reconstruction if needed to make an intersection work.

6.5 Interim Project Opportunities

Possible interim projects which might be constructed to alleviate congestion include the following:

- Relocation of the Amtrak loading platform: This could be a fairly simple project, to relocate the platform to the east so that Amtrak trains do not block SR 347 during loading and unloading. Amtrak and UPRR officials are willing to consider this concept.
- Connecting Maricopa-Casa Grande Highway into Honeycutt Road: This concept, as included in Option 2, would eliminate one intersection with SR 347 and improve traffic operations in the vicinity of the UPRR crossing. City staff have indicated that the right-of-way might be available for this use. This concept could work for all options, but would be a throw-away cost for all options except Option 2.
- Phased construction of the main project: While it would likely be most economical to construct the entire major project at one time, it may be possible to phase portions of the project to get some early relief. For example, it might be possible to construct half of the ultimate railroad crossing bridge early to accommodate four lanes of traffic, and build the remainder of the bridge at a later time.

6.6 Recommendations for “Next Steps”

Many of the aspects of this project should be reviewed and a detailed implementation plan should be developed, taking into consideration dates when funding from various sources would be available, and viability of interim projects. Next steps would be:

- 1) Develop a detailed implementation plan based on currently available information.
- 2) Determine viability of, and desire for, interim project to help alleviate congestion until full funding becomes available.
- 3) Develop alternatives funding sources, such as Congestion Mitigation / Air Quality (CMAQ), or other similar sources of funding.

APPENDIX A

Roadway Design ParametersPage 1 - 29

SR 347 UPRR Grade Separation Project Roadway Design Parameters

Prepared for
The City of Maricopa and the Arizona Department of Transportation

Prepared by
**HDR Engineering, Inc.
5210 E. Williams Circle, Suite 530
Tucson, Arizona 85711**

December 2006

Plans Preparation

Conceptual roadway plans will be prepared to the following criteria:

- Horizontal:

1"=50' (22" x 34")
- Vertical:

1"=5' (22" x 34")
- Cross Sections:

Cross sections and earthwork calculations will be prepared per ADOT Roadway Design Manual, Section 700.
- Mapping:

May 2006 aerial photogrammetry and digital terrain model within the project limits were prepared by Sun Mapping, LLC and was field checked by HDR in May 2006.
- Arizona State Plane:

Mapping Zone: Arizona Central 0202
- Coordinate System:

Horizontal Datum: NAD 1983, International Feet
Vertical Datum: NAVD88
- Project Control

The project coordinate system and horizontal and vertical control are based upon published N.G.S. data. Site calibration was performed by HDR using the following Horizontal & Vertical Control Values at Project Ground Surface:

Point	Northing	Easting	Elevation	Description
B 422	747743.4650	660245.5790	1173.770	NGS Pt. – Stainless Rod In Sleeve
L 521	787917.8331	671915.9750	1144.670	NGS Pt.-3" Brass Cap In Rock Outcrop
Reference Values:				
State Plane Northing = (Ground Values) * GAF (1.000149572)				
State Plane Easting = (Ground Values) * GAF (1.000149572)				

- Basis of Bearing:

Basis of Bearing being N 16°11'54" E, 41,835.129' (At Project Ground Surface) between NGS Pt. B 422 and NGS Pt. L 521 (See Coordinates above).
- Basis of Elevation:

Basis of Elevation is N.G.S. Control Point B 422, a found stainless steel rod in sleeve. The elevation is 1173.770, based on the North American Vertical Datum (NAVD) of 1988.

General

- This project will be designed in English units
- Design Year – 2030
- Pavement Design Life – 20 years

Design Speeds

- SR 347 (ADOT Facility)

50 mph - Urban Arterial Streets with Curb and Gutter Development in Level Terrain

Non-Controlled Access
- Maricopa-Casa Grande Highway and Honeycutt Road (Maricopa Facilities)

45 mph – Urban Arterial Streets with Curb and Gutter Development

Non-Controlled Access
- Minor Arterials and City Streets (Maricopa Facilities)

30 mph - Urban Arterial Streets with Curb and Gutter Development in Level Terrain

Non-Controlled Access

Sight Distance

- Height of Driver's Eye - 3.5 feet
- Height of Object - 2.0 feet
- Minimum Stopping Sight Distance – RDG Figure 201.2

Superelevation

- Minimum Normal Cross Slope - 2%
- Maximum superelevation - 4% (non-controlled access)
- Maximum Side Friction - 0.14 (DS = 50 mph), 0.20 (DS = 30 mph)
- Curvature/Superelevation/Design Speed Relationships – RDG Table 202.3A
- Superelevation Transitions – RDG Figures 202.3A and 202.3B

- Maximum Longitudinal Break Over for Same-Direction Lanes - 1%
- Maximum Longitudinal Break Over for Opposite-Direction Lanes - 4%
- Maximum Longitudinal Break Over for Shoulder - 4%

Typical Roadway Cross-Section

- Typical Section – UA (Maricopa-Casa Grande Highway, Honeycutt Road and modified for SR 347)
- Typical Section – UB (Minor City Streets and Arterials)
- Minimum Lane Width – 12 feet
- Minimum Inside Shoulder - 2 feet (plus 2 feet if adjacent to beam guardrail or concrete barrier)
- Minimum Outside Shoulder - 4 feet (plus 2 feet if adjacent to beam guardrail or concrete barrier)
- Minimum Median Width – 20 feet face to face of curb
- Median Surfacing – Paved concrete crowned at center
- Minimum Two-way Left-Turn Lane Width – 12 feet
- Minimum Number of Lanes = 6 (SR 347, Maricopa-Casa Grande Highway, Honeycutt Road)
- Minimum Number of Lanes = 2 (Minor City Streets and Arterials)
- Outside Shoulder, Raised Median and Islands – ADOT Type G Single Curb or Curb and Gutter, h=6"

Horizontal Curvature

- Minimum Central Angle – 2°
- Maximum Degree of Curvature – 6° / 20° (DS = 50/30 mph)
- Minimum Degree of Curvature – 0°15' (R = 22,920 feet)
- Minimum Middle Ordinate – RDG Figure 203.2
- Maximum Central Angle Break without a Horizontal Curve = 45 minutes
- Minimum Curve Length - 500 feet for a Central Angle of 5° (100 feet extra for each 1° decrease in the Central Angle) or 15 times the design speed

Vertical Curvature

- Maximum Gradient – 6% / 8% (DS = 50/30 mph) per RDG Table 204.3
- Minimum Gradient for Curb and Gutter Section – 0.4%
- Maximum Algebraic Difference without a Vertical Curve = 0.20% / 0.40% (DS = 50/30 mph)
- Minimum Vertical Curve Length – RDG Figures 204.4A (crest) and 204.4C (sag) or 3 times the Design Speed, whichever is greater.

Side Slopes

- Recovery Area – RDG Table 303.2A, 1.5 feet clear behind curbing for Urban Environments
- Barrier Requirements – RDG Figure 303.2
- ADOT Std. C-02.10, 3:1 maximum for side slopes and RDG Figures 306.4A and 306.4C

Transition Taper Rates

- Four-lane to Two-lane Facility – Design Speed to 1
- Lane Drops – Design Speed to 1
- Through-Lane Additions – 25 to 1 on the outside
- Shoulder Tapers – 15 to 1 (narrower to wider), Design Speed to 1 (wider to narrower)

Vertical Clearance

- Clearance at Over-crossings – 16'-6" (includes 6" allowance for future AC overlays)
- Clearance at Under-crossings - 16'-0" (includes 6" allowance for future AC overlays)
- Clearance over the Union Pacific Railway – 23 feet above the top of rail
- Clearance over Pedestrian Overpasses or Sign Structures – 17'-6"
- Clearance at Sign Structures – 17'6"

At-Grade Intersections

- Design Vehicle – WB 50
- Maximum Centerline Intersection Skew - 15°

Intersection Sight Distance – **RDG Figure 408.4B**

Maximum Approach Grade – 3% for 400 feet

Left-Turn Channelization – Traffic Engineering Group PGP **Section 430**

Right-Turn Channelization - Traffic Engineering Group PGP **Section 430**

Minimum/Desirable Turn Lane Width – 12 feet

Minimum Median Width – 4 feet at nose

Gap Lengths - Traffic Engineering Group PGP **Section 430**

Storage Lengths - Traffic Engineering Group PGP **Section 430** (50 feet minimum)

Dual Left-Turn Lanes – Use if Left-Turn demand exceeds 300 vph

Acceleration Lanes – **RDG Figure 408.12B**

Urban Driveways – 2% Grade for 10/40 feet minimum (residential/commercial), 10 foot vertical curves required for grade breaks greater than 6%

Bridge Structures

Single Span Depth-to-Span Ratios – 0.050/0.060 (130-240 feet/less than 130 feet)

Multiple Span Depth-to-Span Ratios – 0.045/0.050 (over 125 feet/less than 125 feet)

Width - Match roadway width

Loading - Live load per AASHTO HS 20-44

Barrier - ADOT Type F (Median – 42 inches, Outside – 32 inches)

Drainage

Pavement

10 years for at-grade/elevated

50 years for depressed roadway

Allowable Spread

SR 347, MCG Highway, Honeycutt - Half of outside lane

Minor Cross-Streets - One lane open

Cross Culverts

50 years

100 years - Evaluate

Storm Drains

10 years

Channels

50 years

100 years – Evaluate

Traffic

Signing – Permanent

Lighting – Continuous (per City of Maricopa Standards)

Miscellaneous Features

Barrier

ADOT Type F

Barrier End Treatment

ADOT SKT 350 or ET-PLUS

Fencing Type

Not required for non-controlled access urban highway

Retaining Walls

Use ADOT Standard Drawing B-18 Series or appropriate pre-approved proprietary alternative retaining wall systems.

Sound Barrier Walls

Use ADOT Standard Drawings 8.01 and 8.02 or appropriate pre-approved proprietary alternate sound barrier wall systems.

PROJECT		SR 347 Dwell Feasibility Report	
SUBJECT		Option 1 Horizontal Geometry	
MADE BY	HAC	DATE	Dec-00
CHECKED BY		MMB	DATE
			Dec-00
SHEET NO:		1	OF 1
PROJECT NO:		41030	

Curve #	Stationing	Delta			Degree of Curvature			Curve Properties					
		PI Station	W Station	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds	Length	Tangent		
RC 324.001	77+22.42	80+02.10		62		35	3	20	12	1717.21	656.74	205.46	23.24
SR 347.21A	74+38.66			19									
Highpoint R11B	14+68.37	15+60.2	24+13.92	54	7	0	6	43	40	1002.00	944.85	510.83	100.47
MOB Highway 30	13+74.5	24+08.71	20+75.35	101	10	4	6	44	26	850.00	1500.85	1034.21	340.29
MOB Highway 1D	34+05.52	30+06.97	42+04.01	53	40	25	6	44	26	650.00	790.49	431.45	82.06

Supervallion

Curve 1A	Curve 1B	Curve 1C	Curve 20
0.0400	0.0405	0.0400	0.0400
60	45	45	45
3.337	5.729	6.741	6.741
0	0.0330	0.0400	0.0400
0.02930	0.0330	0.0400	0.0400
150	167	176	176
0.05	0.05	0.05	0.05

Stopping Sight Distance

	Curve A	Curve B	Curve C	Curve D
V_i (mPa)	50	46	45	46
α (%)	-0.5166	-0.6000	-0.6000	-0.6000
SD (%)	427	302	302	302

Minimum Length of Middle Ordinate

	Curve 1A	Curve 1B	Curve 1C	Curve 20
DO ₂	5.34	5.73	6.74	6.74
SD ₂	4.27	3.62	3.62	3.62
N ₂	11.25	16.35	16.23	16.23
M ₂	23.25	22.09	22.00	22.00
Grav	OK	OK	OK	OK

Actual Speed

Curve 1A	Curve 1B	Curve 2C	Curve 2D
Y-axis (m/s)	60.75	49.22	49.22
SD (m/s)	678.60	469.30	418.42

PROJECT SR 347 Rail Feasibility Report

SUBJECT Union 2 Railroad Germany

MADE BY JAS

SHEET NO: 1 OF 1

PROJECT NO: 41830

DATE 10-06

CHECKED BY MJB

DATE 10-06

Curve #	Stationing		Delta		Offset (ft)		Curve Properties	
	PC Station	PT Station	Station	Station	Station	Station	Radius	Length
SR 347 (A)	74+38.08	77+22.42	10	52	3	20	12	517.21
SR 347 (B)	10+34.12	22+44.03	54	7	5	43	40	1000.00
								944.55
								510.03
								199.17

Superelevation

Curve #	Stationing	Curve #	Stationing
SR 347 (A)	74+38.08	SR 347 (B)	10+34.12
SR 347 (B)	10+34.12	SR 347 (C)	22+44.03
SR 347 (C)	22+44.03	SR 347 (D)	54+7
SR 347 (D)	54+7	SR 347 (E)	7
SR 347 (E)	7	SR 347 (F)	5
SR 347 (F)	5	SR 347 (G)	43
SR 347 (G)	43	SR 347 (H)	40
SR 347 (H)	40	SR 347 (I)	1000.00
SR 347 (I)	1000.00	SR 347 (J)	944.55
SR 347 (J)	944.55	SR 347 (K)	510.03
SR 347 (K)	510.03	SR 347 (L)	199.17

Stationing Sight Distance

Curve #	Stationing	Curve #	Stationing
SR 347 (A)	74+38.08	SR 347 (B)	10+34.12
SR 347 (B)	10+34.12	SR 347 (C)	22+44.03
SR 347 (C)	22+44.03	SR 347 (D)	54+7
SR 347 (D)	54+7	SR 347 (E)	7
SR 347 (E)	7	SR 347 (F)	5
SR 347 (F)	5	SR 347 (G)	43
SR 347 (G)	43	SR 347 (H)	40
SR 347 (H)	40	SR 347 (I)	1000.00
SR 347 (I)	1000.00	SR 347 (J)	944.55
SR 347 (J)	944.55	SR 347 (K)	510.03
SR 347 (K)	510.03	SR 347 (L)	199.17

Minimum Length of Middle Ordinate

Curve #	Stationing	Curve #	Stationing
SR 347 (A)	74+38.08	SR 347 (B)	10+34.12
SR 347 (B)	10+34.12	SR 347 (C)	22+44.03
SR 347 (C)	22+44.03	SR 347 (D)	54+7
SR 347 (D)	54+7	SR 347 (E)	7
SR 347 (E)	7	SR 347 (F)	5
SR 347 (F)	5	SR 347 (G)	43
SR 347 (G)	43	SR 347 (H)	40
SR 347 (H)	40	SR 347 (I)	1000.00
SR 347 (I)	1000.00	SR 347 (J)	944.55
SR 347 (J)	944.55	SR 347 (K)	510.03
SR 347 (K)	510.03	SR 347 (L)	199.17

Actual Speed

Curve #	Stationing	Curve #	Stationing
SR 347 (A)	74+38.08	SR 347 (B)	10+34.12
SR 347 (B)	10+34.12	SR 347 (C)	22+44.03
SR 347 (C)	22+44.03	SR 347 (D)	54+7
SR 347 (D)	54+7	SR 347 (E)	7
SR 347 (E)	7	SR 347 (F)	5
SR 347 (F)	5	SR 347 (G)	43
SR 347 (G)	43	SR 347 (H)	40
SR 347 (H)	40	SR 347 (I)	1000.00
SR 347 (I)	1000.00	SR 347 (J)	944.55
SR 347 (J)	944.55	SR 347 (K)	510.03
SR 347 (K)	510.03	SR 347 (L)	199.17

PROJECT: SR 347 Final Feasibility Report

SHEET NO: 1 OF 1

PROJECT NO: 41130

SUBJECT: Option 4 Horizontal Geometry

MADE BY: HAE

DATE: Dec 08

CHECKED BY: MHB

DATE: Dec 08

Curve #	P/C Station	Mileage	Stationing			Dependent Curves			Curve Properties		
			Station	Station	Station	Station	Station	Station	Station	Station	Station
SR 347-1A	74+34.96	77+22.42	84+02.70	18	52	35	2	12	1712.21	585.74	285.40
SR 347-1B	14+68.22	18+80.05	24+13.77	54	7	0	6	4	1000.00	844.55	570.83
SR 347-1C	8+45.49	14+31.82	17+50.36	66	38	39	7	51	725.00	842.87	478.33
SR 347-1D	17+08.35	23+83.64	26+00.00	120	43	20	17	12	333.00	701.06	585.29
SR 347-1E	12+53.72	25+03.00	25+03.00	234	0	50	13	47	335.00	1246.26	-1.00
SR 347-1F	10+03.00	13+70.31	10+01.74	54	6	60	7	64	725.00	884.74	375.31
SR 347-1G	10+03.00	25+03.00	23+03.00	175	40	33	7	28	775.00	1080.94	1510.47

Superelevation

Curve #	Curve 1A	Curve 1B	Curve 1C	Curve 1D	Curve 1E	Curve 1F	Curve 1G
From RDG Page 200-5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From RDG Page 100-3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From Curve Properties	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-18, Figure 202.5A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Minimum Sight Distance

Curve #	Curve 1A	Curve 1B	Curve 1C	Curve 1D	Curve 1E	Curve 1F	Curve 1G
From ADOT RDG Page 200-3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Minimum Length of Middle Ordinate

Curve #	Curve 1A	Curve 1B	Curve 1C	Curve 1D	Curve 1E	Curve 1F	Curve 1G
From ADOT RDG Page 200-21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Adverse Slope

Curve #	Curve 1A	Curve 1B	Curve 1C	Curve 1D	Curve 1E	Curve 1F	Curve 1G
From ADOT RDG Page 200-5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
From ADOT RDG Page 200-5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

		SHEET NO: 1 OF 1	
		PROJECT NO: 41638	
PROJECT	SR 347 Draft Feasibility Report		
SUBJECT	Option 5 Horizontal Geometry		
MADE BY	HAE	DATE	Jan-07
		CHECKED BY	MHB
		DATE	Jan-07

Curve #	Stationing			Delta			Degree of Curvature			Curve Properties			
	PC Station	PI Station	PT Station	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds	Radius	Length	Tangent	M
SR 347-1A	4+18.84	7+88.66	11+24.18	42	32	25	6	1	52	950.00	705.35	369.26	64.71
SR 347-1B	14+32.34	18+10.05	21+51.35	43	21	52	6	1	52	950.00	719.01	377.71	67.22
SR 347-1C	27+51.35	31+11.01	34+38.99	41	28	21	6	1	52	950.00	687.64	359.66	61.54
SR 347-1D	37+43.86	41+11.35	44+45.16	42	17	47	6	1	52	950.00	701.30	387.49	63.98
SR 347-1E	74+36.96	77+22.42	80+02.70	18	52	35	3	20	12	1717.21	565.74	285.46	23.25
Ramp West-1F	9+39.42	12+27.67	14+88.14	43	21	52	7	54	10	725.00	548.72	288.25	51.30
Ramp West-1G	24+98.21	27+91.62	30+59.18	41	28	21	7	23	35	775.00	560.97	293.41	50.20
Ramp East-1H	10+99.13	14+18.03	17+00.0	47	29	9	7	54	10	725.00	600.87	318.90	61.36
Ramp East-1I	23+00.00	25+82.86	28+35.71	45	28	21	8	29	18	675.00	535.71	282.86	52.45
MCGH-1J	22+38.09	26+37.64	29+79.21	53	4	43	7	9	43	800.00	741.12	399.55	84.30
MCGH-1K	36+19.87	42+19.92	45+62.40	90	0	17	9	32	57	600.00	942.53	600.05	175.75
MCGH-1L	71+33.32	75+12.54	78+65.94	36	30	2	4	58	56	1150.00	732.62	379.22	57.65

Superelevation

SR 347 Curves

Ramp West Curves

Ramp East Curves

Maricopa Casa-Grande Highway Curves

	Curve 1A	Curve 1B	Curve 1C	Curve 1D	Curve 1E	Curve 1F	Curve 1G	Curve 1H	Curve 1I	Curve 1J	Curve 1K	Curve 1L
e_{max} (ft/ft)	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400
V_s (mph)	50	50	50	50	50	40	40	40	40	40	40	50
D_c	6.031	6.031	6.031	6.031	3.337	7.903	7.393	7.903	8.488	7.162	9.549	4.982
e_{min} (ft/ft)	0.0400	0.0400	0.0400	0.0400	0.0350	0.0380	0.0380	0.0380	0.0390	0.0380	0.0400	0.0390
L_s (ft)	192	192	192	192	165	79	79	79	79	154	164	188
ϵ	0.85	0.85	0.85	0.85	0.85	0.8	0.8	0.8	0.8	0.9	0.9	0.85

*From RDG Page 200-5
*From RDG Page 100-3
*From Curve Properties
*From ADOT RDG Page 200-16
*From ADOT RDG Page 200-16
*From ADOT RDG Page 200-13, Figure 202.3A

Stopping Sight Distance

	Curve 1A	Curve 1B	Curve 1C	Curve 1D	Curve 1E	Curve 1F	Curve 1G	Curve 1H	Curve 1I	Curve 1J	Curve 1K	Curve 1L
V_o (mph)	50	50	50	50	50	40	40	40	40	40	40	50
G (%)	-0.5000	-3.0000	-2.0000	-2.0000	-0.5000	-0.5000	-3.0000	-0.5000	3.0000	-0.5000	-0.5000	-3.0000
SD_s (ft)	427	446	438	438	427	303	315	303	288	303	303	446

*From ADOT RDG Page 200-3

Minimum Length of Middle Ordinate

	Curve 1A	Curve 1B	Curve 1C	Curve 1D	Curve 1E	Curve 1F	Curve 1G	Curve 1H	Curve 1I	Curve 1J	Curve 1K	Curve 1L
D_c	6.03	6.03	6.03	6.03	3.34	7.90	7.39	7.90	8.49	7.16	9.55	4.98
SD_s (ft)	427	446	438	438	427	303	315	303	288	303	303	446
M_{min}	23.87	26.05	25.13	25.13	13.25	15.73	15.93	15.73	15.32	14.26	18.97	21.55
M_{max}	27.00	27.00	27.00	27.00	23.25	16.00	16.00	16.00	16.00	22.00	22.00	22.00
Check	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

*From ADOT RDG Page 200-21
*The lesser of Curve Properties and Physical Limitations (MCG/Honeycutt = 22', SR 347 = 27', and Ramps = 16')

Actual Speed

	Curve 1A	Curve 1B	Curve 1C	Curve 1D	Curve 1E	Curve 1F	Curve 1G	Curve 1H	Curve 1I	Curve 1J	Curve 1K	Curve 1L
f	0.14	0.14	0.14	0.14	0.14	0.16	0.16	0.16	0.16	0.16	0.16	0.14
V_{SA} (mph)	50.65	50.65	50.65	50.65	67.14	46.40	47.98	46.40	44.89	48.74	42.43	55.57
SD_{Actual} (ft)	435.52	455.14	446.93	446.93	685.02	379.89	417.72	379.89	376.28	410.16	330.93	528.05

*From ADOT RDG Page 200-5
*From ADOT RDG Page 200-4
*From ADOT RDG Page 200-3

Table 101.3	
Relation of Highway Type to Design Speed	
Highway Type	Design Speed (mph)
Controlled Access Highways	
Level terrain*	75
Rolling terrain	75
Mountainous terrain	65
Urban/Fringe Urban areas	65
Rural Divided Highways	
Level terrain	70
Rolling terrain	65
Mountainous terrain	60
Rural Non-divided Highways	
Level terrain	70
Rolling terrain	65
Mountainous terrain	55**
Urban/Fringe Urban Highways	
Arterial streets (C & G With Development)	30 – 50
Urban Highways	30 – 60

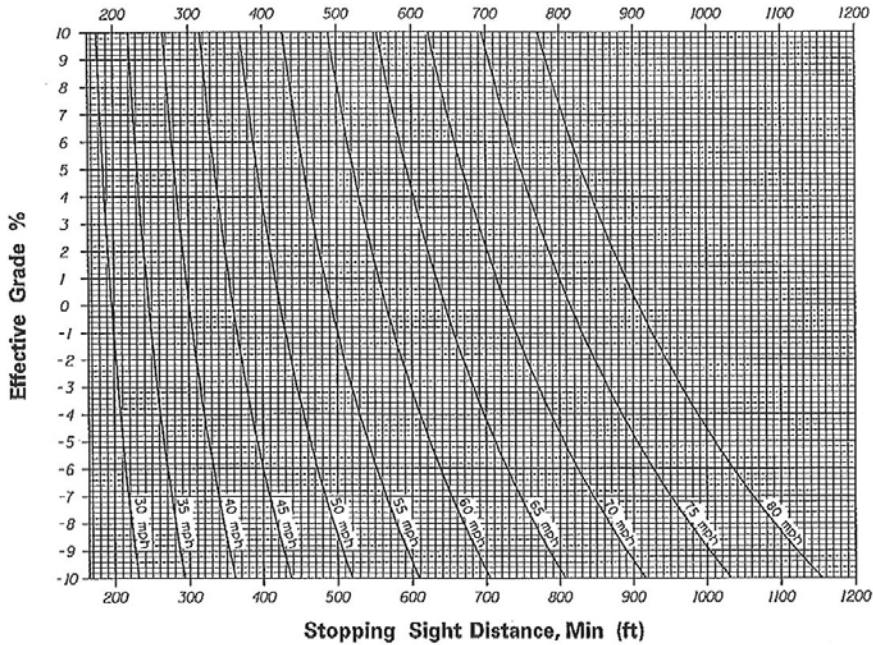
* Note: Throughout this document, level, rolling and mountainous terrain are defined as follows:

LEVEL TERRAIN: Any combination of geometric design elements that permits trucks to maintain speeds that equal or approach speeds of passenger cars.

ROLLING TERRAIN: Any combination of geometric design elements that causes trucks to reduce speed substantially below that of passenger cars on some sections of the highway but which does not involve sustained crawl speeds by trucks for any substantial distance.

MOUNTAINOUS TERRAIN: Any combination of geometric design elements that will cause trucks to operate at crawl speed for considerable distances or at frequent intervals.

** Note: The Designer should try to achieve a 60 mph design speed if there is the expectation of future development to a 4-lane divided highway.



$$SD_s = 1.47 \times V_D \times t + \frac{V_D^2}{30 \left(\frac{a}{32.2} \pm G \right)}$$

Where:

- SD_s = Stopping Sight Distance, Min (ft)
- V_D = Design Speed, mph
- a = Assumed Deceleration, 11.2 ft/sec²
- G = Effective percent of Grade Divided By 100
- t = Assumed Brake Reaction Time, 2.5 Sec.

Modified AASHTO EQ 3-2 + AASHTO EQ 3-3

SD_s = Distance traversed during the brake reaction time plus distance to bring the vehicle to a stop on a grade.

80 mph shown for information purposes only.

RELATION OF STOPPING SIGHT DISTANCE
TO DESIGN SPEED AND EFFECTIVE GRADE
FIGURE 201.2

TABLE 201.3		Passing Sight Distance = $d_1 + d_2 + d_3 + d_4$, where:	
Minimum Passing Sight Distance for Given Design Speed		$d_1 = 1.47t_1\left(v - m + \frac{at_1}{2}\right)$	t_1 = time of initial maneuver, s; a = average acceleration, mph/s; v = average speed of passing vehicle, mph; m = difference in speed of passed vehicle and passing vehicle, mph;
DESIGN SPEED (mph)	MINIMUM PASSING SIGHT DISTANCE (ft)	$d_2 = 1.47vt_2$	t_2 = time passing vehicle occupies left lanes, s; v = average speed of passing vehicle, mph.
30	1,090	$d_3 = 100 \text{ ft to } 300 \text{ ft}$	d_3 = the distance between opposing vehicles at the end of passing maneuvers, ft;
40	1,470		
45	1,625		
50	1,835		
55	1,985		
60	2,135		
65	2,285	$d_4 = \frac{2d_2}{3}$	d_4 = distance traveled by an opposing vehicle, ft.
70	2,480		
75	2,580		
See AASHTO Exhibits 3-5 and 3-7			

202 - Superelevation

202.1 - General

In order to provide a safe, comfortable horizontal alignment for a highway, it is necessary to establish relationships between design speed and curvature and their joint relationship with superelevation and side friction. As any object travels in a circle, centrifugal force tends to move the object outward. For vehicles traveling on highway curves, centrifugal force is resisted by a combination of superelevation and friction between pavement and tires (side friction).

From the laws of mechanics, an approximate relationship for the four variables can be written:

$$f = \frac{V^2}{15R} - e$$

AASHTO EQ 3-9

where:
 R = radius of curve, ft;
 V = design speed, mph;
 e = rate of roadway superelevation, ft/ft;
 f = side friction factor.

Based on studies, including some performed in Arizona, maximum side friction is generally accepted as varying directly with speed, see Table 202.1B. Given a value for side friction, rates of superelevation can be calculated for combinations of speeds and curve radii. Thus, for any given radius and speed, there are an infinite number of superelevation and side friction combinations. ADOT, like most highway agencies, has established maximum rates of superelevation which are permitted for different locations and environmental conditions.

In determining a maximum allowable rate of superelevation, several factors must be taken into consideration including the potential for icy road conditions, the possibility of vehicle speeds significantly less than the design speed, driver comfort, and right-of-way constraints. With icy and wet roadway conditions, poor visibility and heavy traffic, drivers are constrained to drive at speeds considerably less than the design speed. Superelevation rates should not be so steep as to introduce driver discomfort or across-road sliding at reduced speeds.

ADOT's maximum rates of superelevation are shown in Table 202.1A.

Table 202.1A

Relation of Highway Types to Maximum Superelevation

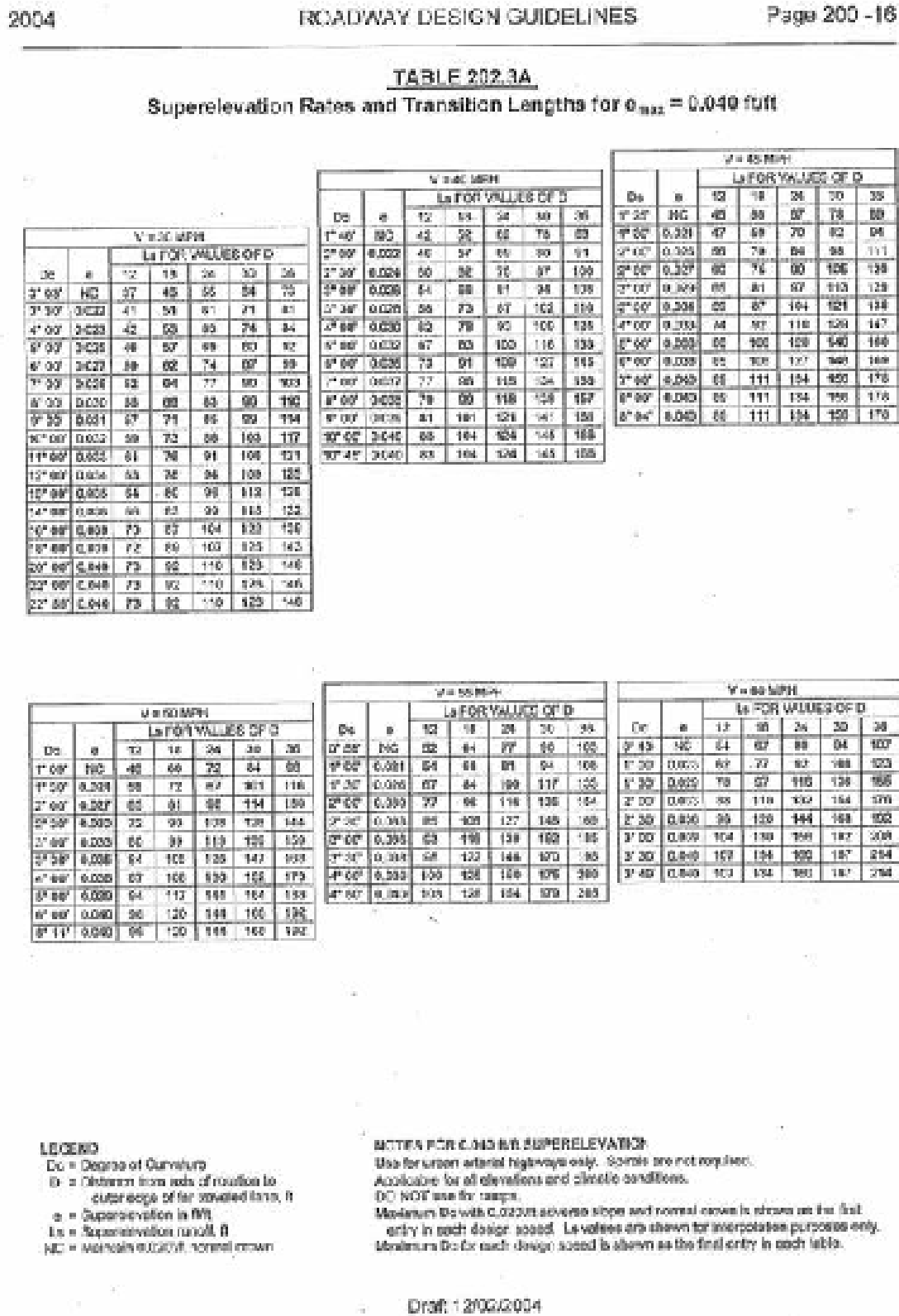
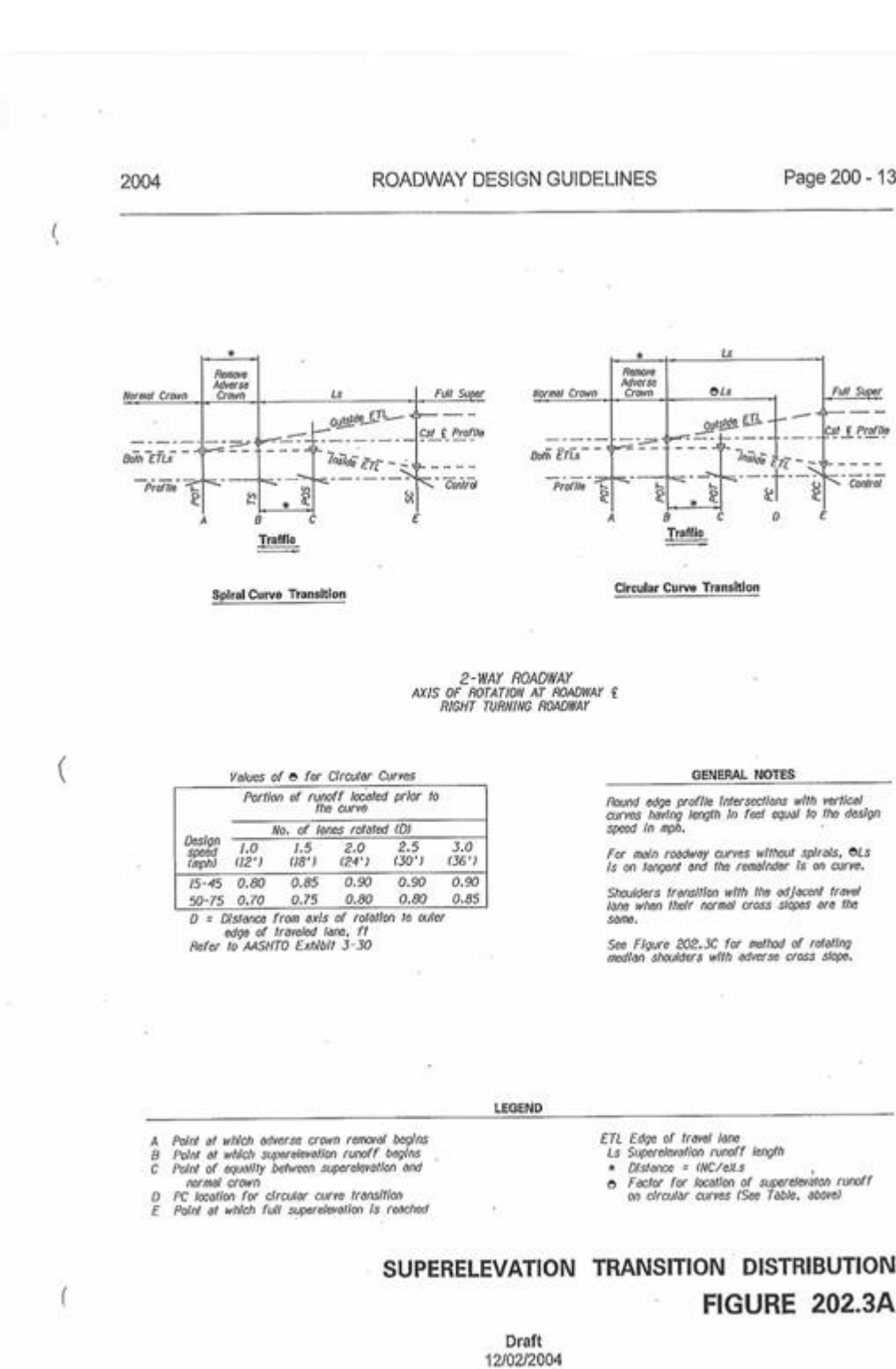
Highway Types	Maximum Superelevation a/r
Rural Highways	
Controlled and non-controlled access	
Elevation < 4000 ft	0.100
4000 ft - 6000 ft	0.080
Elevation > 6000 ft	0.060
Urban Highways	
Controlled access	0.060
Non-controlled access	0.040

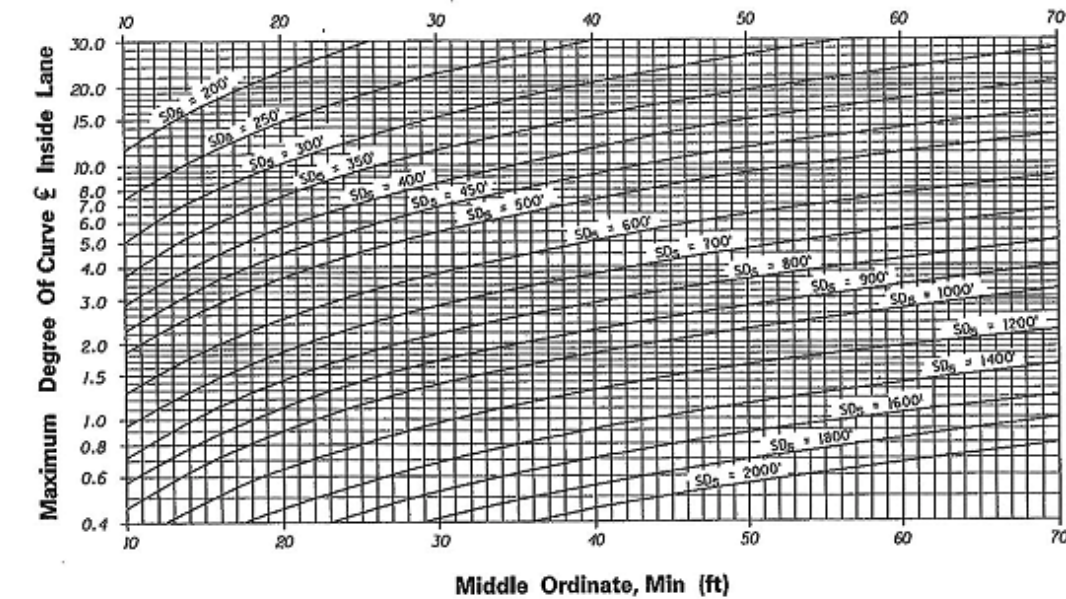
Table 202.1B

Relation of Design Speed to Maximum Side Friction, f

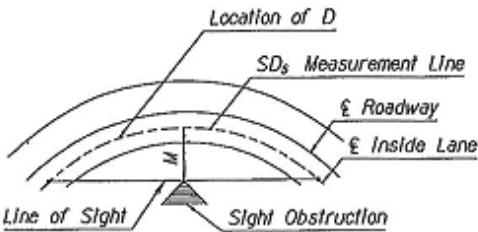
Design Speed (mph)	Limiting Values of f
30	0.20
35	0.18
40	0.16
45	0.15
50	0.14
55	0.13
60	0.12
65	0.11
70	0.10
75	0.09

Note: For ramps refer to Chapter 500





NOTE
See Figure 201.2 for Stopping Sight Distance (SD_s)
See Figures 202.3 A,B,C & D for Degree of Curvature and Superelevation



MIDDLE ORDINATE :

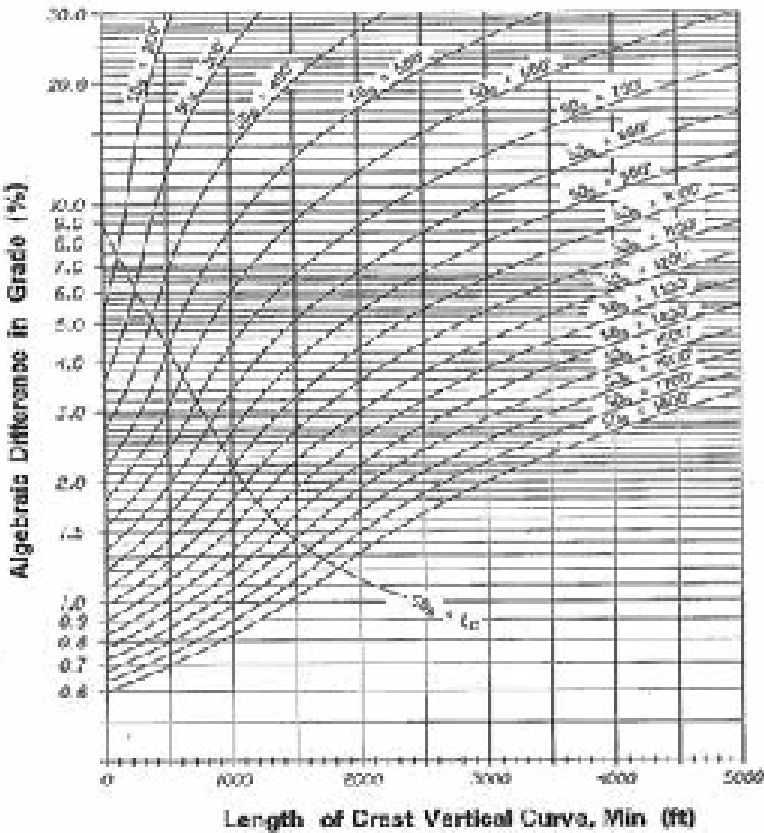
$$M = \frac{5730}{D} \left(1 - \cos \left(\frac{(SD_s)D}{200} \right) \right)$$

Where:
M = Length of Middle Ordinate, Min (ft)
SD_s = Stopping Sight Distance (ft) Along Centerline of Inside Lane
D = Maximum Degree of Curvature on Center Line of Inside Lane

For M Using Radius - See AASHTO Formula 3-40

STOPPING SIGHT DISTANCE HORIZONTAL CURVES
FIGURE 203.2

Draft
12/02/2004



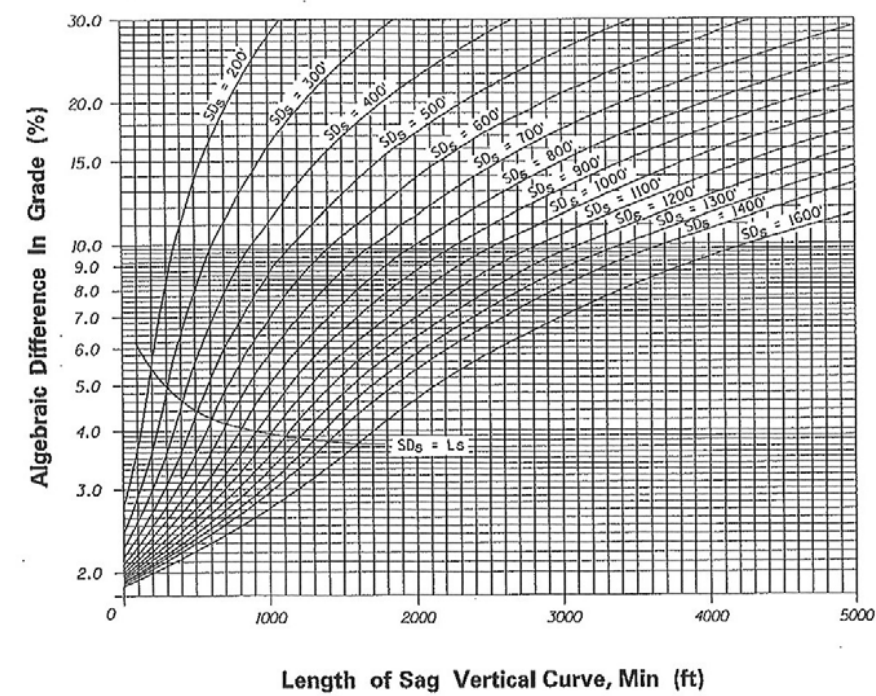
For $SD_s < L_c$ $L_c = \frac{A (SD_s)^2}{2158}$

For $SD_s > L_c$ $L_c = 2(SD_s) - \frac{2158}{A}$

Where:
SD_s = Stopping Sight Distance, (ft)
L_c = Length of Crest Vertical Curve, Min (ft)
A = Algebraic Difference in Grade, (%)

RELATION OF MINIMUM LENGTH OF CREST VERTICAL CURVES TO STOPPING SIGHT DISTANCE
FIGURE 204.4A

Draft
12/02/2004



$$\text{For } SD_s < L_c \quad L_c = \frac{A(SD_s)^2}{2800}$$

$$\text{For } SD_s > L_c \quad L_c = 2(SD_s) - \frac{2800}{A}$$

Where:

SD_s = Stopping Sight Distance, (ft)

L_c = Length of Sag Vertical Curve, Min (ft)

A = Algebraic Difference In Grade, (%)

RELATION OF MINIMUM LENGTH OF SAG VERTICAL CURVES TO STOPPING SIGHT DISTANCE

FIGURE 204.4C

SR 347 - Draft Feasibility Report										December 26, 2006		HDR Engineering, Inc.			
SR 347 Vertical Curves & Grades - AASHTO & ADOT Criteria & Methods										One Way Traffic With Station = 1u		MHB			
										One Way Traffic Against Station = 1d		V-12172004			
Design Speed = 50 MPH										Two Way Traffic = 2					
PVI Station	PVI Elevation			C S	'84 AASHTO VC Lengths		'01 AASHTO VC Length	'04 ADOT VC Length	Actual VC Length	Actual "k" Factor	Controlling		Corr Factor	'04 ADOT	
		Grades	AD		Min	Des					Station	Elev		Actual SSD	Design Speed
SR 347 (Option 1)															
32+00.0000	1175.0000														
		0.5000%									PVC	33+00.00	1175.5000		
36+00.0000	1177.0000		3.5000	S	315	385	336	109	600	171.4	PVT	39+00.00	1189.0000	2.6250	714 66
		4.0000%									PVC	41+50.00	1199.0000		
45+00.0000	1213.0000		7.0000	C	770	1,120	588	670	700	100.0	PVT	48+50.00	1202.4999	-6.1250	465 51
		-3.0000%									PVC	56+16.66	1179.5000		
57+66.6600	1175.0000		2.5000	S	225	275	240		300	120.0	PVT	59+16.66	1174.2500	0.9375	767 70
		-0.5000%									PVC				
62+66.6600	1172.5000										PVT				
											PVC				
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Project Name: Option 1 SR 347			
Description: Option 1			
Horizontal Alignment Name: SR 347			
Description: Option 1			
Style: default			
Vertical Alignment Name: SR 347 - Crest			
Description: Over RR			
Style: default			
Input Factor: 1.0000			
		STATION	ELEVATION
Element: Linear			
	POB	32+00.0000	1175.0000
	PVC	33+00.0000	1175.5000
	Tangent Grade:	0.5000	
	Tangent Length:	100.0000	
Element: Parabola			
	PVC	33+00.0000	1175.5000
	PVI	36+00.0000	1177.0000
	PVT	39+00.0000	1189.0000
	Length:	600.0000	
	Entrance Grade:	0.5000	
	Exit Grade:	4.0000	
	$r = (g2 - g1) / L:$	0.5833	
	$K = 1 / (g2 - g1):$	171.4286	
	Middle Ordinate:	2.6250	
Element: Linear			
	PVT	39+00.0000	1189.0000
	PVC	41+50.0000	1199.0000
	Tangent Grade:	4.0000	
	Tangent Length:	250.0000	
Element: Parabola			
	PVC	41+50.0000	1199.0000
	PVI	45+00.0000	1213.0000
	PVT	48+50.0000	1202.4999
	VHIGH	45+49.9991	1207.0000
	Length:	700.0000	
	Entrance Grade:	4.0000	
	Exit Grade:	-3.0000	
	$r = (g2 - g1) / L:$	-1.0000	
	$K = 1 / (g2 - g1):$	99.9998	
	Middle Ordinate:	-6.1250	
Element: Linear			
	PVT	48+50.0000	1202.4999
	PVC	56+16.6600	1179.5000
	Tangent Grade:	-3.0000	
	Tangent Length:	766.6600	
Element: Parabola			
	PVC	56+16.6600	1179.5000
	PVI	57+66.6600	1175.0000
	PVT	59+16.6600	1174.2500
	Length:	300.0000	
	Entrance Grade:	-3.0000	
	Exit Grade:	-0.5000	
	$r = (g2 - g1) / L:$	0.8333	
	$K = 1 / (g2 - g1):$	119.9992	
	Middle Ordinate:	0.9375	
Element: Linear			
	PVT	59+16.6600	1174.2500
	POE	62+66.6600	1172.5000
	Tangent Grade:	-0.5000	
	Tangent Length:	350.0000	

SR 347 - Draft Feasibility Report										December 26, 2006		HDR Engineering, Inc.				
SR 347 Vertical Curves & Grades - AASHTO & ADOT Criteria & Methods										MHB		V-12172004				
Design Speed = 50 MPH										One Way Traffic With Station = 1u		One Way Traffic Against Station = 1d 2				
										Two Way Traffic = 2						
PVI Station	PVI Elevation			C	'84 AASHTO VC Lengths		'01 AASHTO VC Length	'04 ADOT VC Length	Actual VC Length	Actual "k" Factor	Controlling		Corr Factor	'04 ADOT		
		Grades	AD		Station	Elev					Actual SSD	Design Speed				
SR 347 (Option 2 Over)																
32+00.0000	1175.0000	0.5000%									PVC	33+00.00	1175.5000			
36+00.0000	1177.0000		3.5000	S	315	385	336	109	600	171.4	PVT	39+00.00	1189.0000	2.6250	714	66
		4.0000%									PVC	41+50.00	1199.0000			
45+00.0000	1213.0000		7.0000	C	770	1,120	588	670	700	100.0	PVT	48+50.00	1202.4999	-6.1250	465	51
		-3.0000%									PVC	56+16.66	1179.5000			
57+66.6600	1175.0000		2.5000	S	225	275	240		300	120.0	PVT	59+16.66	1174.2500	0.9375	767	70
		-0.5000%									PVC					
62+66.6600	1172.5000										PVT					
											PVC					
											PVT					
Honeycutt Road (Option 2 Over)																
30+00.0000	1190.5000										PVT					
		-2.0000%									PVC	37+50.00	1175.5000			
39+00.0000	1172.5000		2.5000	S	225	275	240		300	120.0	PVT	40+50.00	1173.2500	0.9375	767	71
		0.5000%									PVC					
44+00.0000	1175.0000										PVT					
											PVC					
											PVT					
											PVC					
											PVT					
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											PVT					
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											PVT					
											PVC					
											PVT					

Project Name: Option 2 SR 347 Description: Option 2 Horizontal Alignment Name: SR 347 Description: Option 2 Style: default Vertical Alignment Name: SR 347 - Crest Description: Over RR Style: default Input Factor: 1.0000			
	STATION	ELEVATION	
Element: Linear			
POB	32+00.0000	1175.0000	
PVC	33+00.0000	1175.5000	
Tangent Grade:	0.5000		
Tangent Length:	100.0000		
Element: Parabola			
PVC	33+00.0000	1175.5000	
PVI	36+00.0000	1177.0000	
PVT	39+00.0000	1189.0000	
Length:	600.0000		
Entrance Grade:	0.5000		
Exit Grade:	4.0000		
r = (g2 - g1) / L:	0.5833		
K = 1 / (g2 - g1):	171.4286		
Middle Ordinate:	2.6250		
Element: Linear			
PVT	39+00.0000	1189.0000	
PVC	41+50.0000	1199.0000	
Tangent Grade:	4.0000		
Tangent Length:	250.0000		
Element: Parabola			
PVC	41+50.0000	1199.0000	
PVI	45+00.0000	1213.0000	
PVT	48+50.0000	1202.4999	
VHIGH	45+49.9991	1207.0000	
Length:	700.0000		
Entrance Grade:	4.0000		
Exit Grade:	-3.0000		
r = (g2 - g1) / L:	-1.0000		
K = 1 / (g2 - g1):	99.9998		
Middle Ordinate:	-6.1250		
Element: Linear			
PVT	48+50.0000	1202.4999	
PVC	56+16.6600	1179.5000	
Tangent Grade:	-3.0000		
Tangent Length:	766.6600		
Element: Parabola			
PVC	56+16.6600	1179.5000	
PVI	57+66.6600	1175.0000	
PVT	59+16.6600	1174.2500	
Length:	300.0000		
Entrance Grade:	-3.0000		
Exit Grade:	-0.5000		
r = (g2 - g1) / L:	0.8333		
K = 1 / (g2 - g1):	119.9992		
Middle Ordinate:	0.9375		
Element: Linear			
PVT	59+16.6600	1174.2500	
POE	62+66.6600	1172.5000	
Tangent Grade:	-0.5000		
Tangent Length:	350.0000		

Project Name: Option 2 SR 347 Description: Option 2 Horizontal Alignment Name: Honeycutt Rd Description: Option 2 Layout Style: default Vertical Alignment Name: Honeycutt Rd - Crest Description: CL Style: default Input Factor: 1.0000			
	STATION	ELEVATION	
Element: Linear			
POB	30+00.0000	1190.5000	
PVC	37+50.0000	1175.5000	
Tangent Grade:	-2.0000		
Tangent Length:	750.0000		
Element: Parabola			
PVC	37+50.0000	1175.5000	
PVI	39+00.0000	1172.5000	
PVT	40+50.0000	1173.2500	
VLOW	39+90.0000	1173.1000	
Length:	300.0000		
Entrance Grade:	-2.0000		
Exit Grade:	0.5000		
r = (g2 - g1) / L:	0.8333		
K = 1 / (g2 - g1):	120.0000		
Middle Ordinate:	0.9375		
Element: Linear			
PVT	40+50.0000	1173.2500	
POE	44+00.0000	1175.0000	
Tangent Grade:	0.5000		
Tangent Length:	350.0000		

SR 347 - Draft Feasibility Report

December 26, 2006

HDR Engineering, Inc.

SR 347 Vertical Curves & Grades - AASHTO & ADOT Criteria & Methods

One Way Traffic With Station = 1u

One Way Traffic Against Station = 1d

Two Way Traffic = 2

Design Speed = 50 MPH

MHB

V-12172004

PVI Station	PVI Elevation	Grades	AD	C S	'84 AASHTO VC Lengths		'01 AASHTO VC Length	'04 ADOT VC Length	Actual VC Length	Actual "k" Factor	Controlling		Corr Factor	'04 ADOT	
					Min	Des					Station	Elev		Actual SSD	Design Speed
SR 347 (Option 2 Under)															
33+00.0000	1175.2500	0.5000%									PVC	34+00.00	1175.7500		
			4.5000	C	495	720	378	429	500	111.1	PVT	39+00.00	1167.0000	-2.8125	490 52
36+50.0000	1177.0000	-4.0000%									PVC	41+00.00	1159.0000		
			7.0000	S	630	770	672	516	800	114.3	PVT	49+00.00	1155.0000	7.0000	493 53
45+00.0000	1143.0000	3.0000%									PVC	51+50.00	1162.5000		
			2.5000	C	275	400	210	29	500	200.0	PVT	56+50.00	1171.2500	-1.5625	682 65
54+00.0000	1170.0000	0.5000%									PVC				
											PVT				
59+00.0000	1172.5000										PVC				
											PVT				
											PVC				
											PVT				
Honeycutt Road (Option 2 Under)															
30+00.0000	1164.0000										PVT				
		-2.0000%									PVC	30+75.00	1162.5000		
32+50.0000	1159.0000		4.0000	S	360	440	384	176	350	87.5	PVT	34+25.00	1162.5000	1.7500	400 47
		2.0000%									PVC	35+00.00	1164.0000		
37+50.0000	1169.0000		1.5000	C	165	240	126		500	333.3	PVT	40+00.00	1170.2500	-0.9375	969 81
		0.5000%									PVC				
41+50.0000	1171.0000										PVT				
											PVC				
											PVT				
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											PVT				
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											PVT				
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											PVT				

Project Name: Option 2 SR 347 Description: Option 2 Horizontal Alignment Name: SR 347 Description: Option 2 Style: default Vertical Alignment Name: SR 347 - Sag Description: Under RR Style: default Input Factor: 1.0000			
	STATION	ELEVATION	
Element: Linear	POB	33+00.0000	1175.2500
	PVC	34+00.0000	1175.7500
	Tangent Grade:	0.5000	
	Tangent Length:	100.0000	
Element: Parabola	PVC	34+00.0000	1175.7500
	PVI	36+50.0000	1177.0000
	PVT	39+00.0000	1167.0000
	VHIGH	34+55.5556	1175.8889
	Length:	500.0000	
	Entrance Grade:	0.5000	
	Exit Grade:	-4.0000	
	$r = (g_2 - g_1) / L$:	-0.9000	
	$K = 1 / (g_2 - g_1)$:	111.1111	
	Middle Ordinate:	-2.8125	
Element: Linear	PVT	39+00.0000	1167.0000
	PVC	41+00.0000	1159.0000
	Tangent Grade:	-4.0000	
	Tangent Length:	200.0000	
Element: Parabola	PVC	41+00.0000	1159.0000
	PVI	45+00.0000	1143.0000
	PVT	49+00.0000	1155.0000
	VLOW	45+57.1429	1149.8571
	Length:	800.0000	
	Entrance Grade:	-4.0000	
	Exit Grade:	3.0000	
	$r = (g_2 - g_1) / L$:	0.8750	
	$K = 1 / (g_2 - g_1)$:	114.2857	
	Middle Ordinate:	7.0000	
Element: Linear	PVT	49+00.0000	1155.0000
	PVC	51+50.0000	1162.5000
	Tangent Grade:	3.0000	
	Tangent Length:	250.0000	
Element: Parabola	PVC	51+50.0000	1162.5000
	PVI	54+00.0000	1170.0000
	PVT	56+50.0000	1171.2500
	Length:	500.0000	
	Entrance Grade:	3.0000	
	Exit Grade:	0.5000	
	$r = (g_2 - g_1) / L$:	-0.5000	
	$K = 1 / (g_2 - g_1)$:	200.0000	
	Middle Ordinate:	-1.5625	
Element: Linear	PVT	56+50.0000	1171.2500
	POE	59+00.0000	1172.5000
	Tangent Grade:	0.5000	
	Tangent Length:	250.0000	

Project Name: Option 2 SR 347 Description: Option 2 Horizontal Alignment Name: Honeycutt Rd Description: Option 2 Layout Style: default Vertical Alignment Name: Honeycutt Rd - Sag Description: CL Style: default Input Factor: 1.0000			
	STATION	ELEVATION	
Element: Linear	POB	30+00.0000	1164.0000
	PVC	30+75.0000	1162.5000
	Tangent Grade:	-2.0000	
	Tangent Length:	75.0000	
Element: Parabola	PVC	30+75.0000	1162.5000
	PVI	32+50.0000	1159.0000
	PVT	34+25.0000	1162.5000
	VLOW	32+50.0000	1160.7500
	Length:	350.0000	
	Entrance Grade:	-2.0000	
	Exit Grade:	2.0000	
	$r = (g_2 - g_1) / L$:	1.1429	
	$K = 1 / (g_2 - g_1)$:	87.5000	
	Middle Ordinate:	1.7500	
Element: Linear	PVT	34+25.0000	1162.5000
	PVC	35+00.0000	1164.0000
	Tangent Grade:	2.0000	
	Tangent Length:	75.0000	
Element: Parabola	PVC	35+00.0000	1164.0000
	PVI	37+50.0000	1169.0000
	PVT	40+00.0000	1170.2500
	Length:	500.0000	
	Entrance Grade:	2.0000	
	Exit Grade:	0.5000	
	$r = (g_2 - g_1) / L$:	-0.3000	
	$K = 1 / (g_2 - g_1)$:	333.3333	
	Middle Ordinate:	-0.9375	
Element: Linear	PVT	40+00.0000	1170.2500
	POE	41+50.0000	1171.0000
	Tangent Grade:	0.5000	
	Tangent Length:	150.0000	

SR 347 - Draft Feasibility Report

December 27, 2006

HDR Engineering, Inc.

V-12172004

SR 347 Vertical Curves & Grades - AASHTO & ADOT Criteria & Methods

One Way Traffic With Station = 1u

One Way Traffic Against Station = 1d

Two Way Traffic = 2

Design Speed = 50 MPH

MHB

PVI Station	PVI Elevation	Grades	AD	C S	'84 AASHTO VC Lengths		'01 AASHTO VC Length	'04 ADOT VC Length	Actual VC Length	Actual "k" Factor	Controlling		Corr Factor	'04 ADOT	
					Min	Des					Station	Elev		Actual SSD	Design Speed
SR 347 (Option 3)															
32+00.0000	1175.0000	0.5000%									PVC	33+00.00	1175.5000		
36+00.0000	1177.0000		3.5000	S	315	385	336	109	600	171.4	PVT	39+00.00	1189.0000	2.6250	66
		4.0000%									PVC	41+50.00	1199.0000		
45+00.0000	1213.0000		7.0000	C	770	1,120	588	670	700	100.0	PVT	48+50.00	1202.4999	-6.1250	51
		-3.0000%									PVC	56+16.66	1179.5000		
57+66.6600	1175.0000		2.5000	S	225	275	240		300	120.0	PVT	59+16.66	1174.2500	0.9375	70
		-0.5000%									PVC				
62+66.6600	1172.5000										PVT				
											PVC				
											PVT				
											PVC				
MCG (Option 3)															
30+00.0000	1190.5000										PVT				
		-2.0000%									PVC	37+50.00	1175.5000		
39+00.0000	1172.5000		1.5000	S	135	165	144		300	200.0	PVT	40+50.00	1171.7500	0.5625	>2000
		-0.5000%									PVC				
44+00.0000	1170.0000										PVT				
											PVC				
											PVT				
											PVC				
											PVT				
											PVC				
											PVT				
											PVC				
											PVT				
											PVC				
											PVT				
											PVC				
											PVT				

Project Name: Option 3 SR 347			
Description: Option 3			
Horizontal Alignment Name: SR 347			
Description: Option 3			
Style: default			
Vertical Alignment Name: SR 347 - Crest			
Description: Over RR			
Style: default			
Input Factor: 1.0000			
		STATION	ELEVATION
Element: Linear			
POB		32+00.0000	1175.0000
PVC		33+00.0000	1175.5000
Tangent Grade:		0.5000	
Tangent Length:		100.0000	
Element: Parabola			
PVC		33+00.0000	1175.5000
PVI		36+00.0000	1177.0000
PVT		39+00.0000	1189.0000
Length:		600.0000	
Entrance Grade:		0.5000	
Exit Grade:		4.0000	
$r = (g2 - g1) / L$:		0.5833	
$K = 1 / (g2 - g1)$:		171.4286	
Middle Ordinate:		2.6250	
Element: Linear			
PVT		39+00.0000	1189.0000
PVC		41+50.0000	1199.0000
Tangent Grade:		4.0000	
Tangent Length:		250.0000	
Element: Parabola			
PVC		41+50.0000	1199.0000
PVI		45+00.0000	1213.0000
PVT		48+50.0000	1202.4999
VHIGH		45+49.9991	1207.0000
Length:		700.0000	
Entrance Grade:		4.0000	
Exit Grade:		-3.0000	
$r = (g2 - g1) / L$:		-1.0000	
$K = 1 / (g2 - g1)$:		99.9998	
Middle Ordinate:		-6.1250	
Element: Linear			
PVT		48+50.0000	1202.4999
PVC		56+16.6600	1179.5000
Tangent Grade:		-3.0000	
Tangent Length:		766.6600	
Element: Parabola			
PVC		56+16.6600	1179.5000
PVI		57+66.6600	1175.0000
PVT		59+16.6600	1174.2500
Length:		300.0000	
Entrance Grade:		-3.0000	
Exit Grade:		-0.5000	
$r = (g2 - g1) / L$:		0.8333	
$K = 1 / (g2 - g1)$:		119.9992	
Middle Ordinate:		0.9375	
Element: Linear			
PVT		59+16.6600	1174.2500
POE		62+66.6600	1172.5000
Tangent Grade:		-0.5000	
Tangent Length:		350.0000	

Project Name: Option 3 SR 347			
Description: Option 3			
Horizontal Alignment Name: MCG Highway			
Description: Option 3			
Style: default			
Vertical Alignment Name: MCG Highway - Crest			
Description: CL			
Style: default			
Input Factor: 1.0000			
		STATION	ELEVATION
Element: Linear			
POB		30+00.0000	1190.5000
PVC		37+50.0000	1175.5000
Tangent Grade:		-2.0000	
Tangent Length:		750.0000	
Element: Parabola			
PVC		37+50.0000	1175.5000
PVI		39+00.0000	1172.5000
PVT		40+50.0000	1173.4286
VLOW		39+79.0914	1173.2091
Length:		300.0000	
Entrance Grade:		-2.0000	
Exit Grade:		0.6190	
$r = (g2 - g1) / L$:		0.8730	
$K = 1 / (g2 - g1)$:		114.5457	
Middle Ordinate:		0.9821	
Element: Linear			
PVT		40+50.0000	1173.4286
POE		45+21.8300	1176.3494
Tangent Grade:		0.6190	
Tangent Length:		471.8300	

SR 347 - Draft Feasibility Report										December 26, 2006		HDR Engineering, Inc.			
SR 347 Vertical Curves & Grades - AASHTO & ADOT Criteria & Methods										MHB		V-12172004			
Design Speed = 50 MPH										One Way Traffic With Station = 1u					
										One Way Traffic Against Station = 1d		2			
										Two Way Traffic = 2					
PVI Station	PVI Elevation			C	'84 AASHTO VC Lengths		'01 AASHTO VC Length	'04 ADOT VC Length	Actual VC Length	Actual "k" Factor	Controlling		Corr Factor	'04 ADOT	
		Grades	AD		Min	Des					Station	Elev		Actual SSD	Design Speed
SR 347 (Option 4)															
32+00.0000	1175.0000														
		0.5000%									PVC	33+00.00	1175.5000		
36+00.0000	1177.0000		3.5000	S	315	385	336	109	600	171.4	PVT	39+00.00	1189.0000	2.6250	66
		4.0000%									PVC	41+50.00	1199.0000		
45+00.0000	1213.0000		7.0000	C	770	1,120	588	670	700	100.0	PVT	48+50.00	1202.4999	-6.1250	51
		-3.0000%									PVC	56+16.66	1179.5000		
57+66.6600	1175.0000		2.5000	S	225	275	240		300	120.0	PVT	59+16.66	1174.2500	0.9375	70
		-0.5000%									PVC				
62+66.6600	1172.5000										PVT				
											PVC				
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Project Name: Option 4 SR 347			
Description: Option 4			
Horizontal Alignment Name: SR 347			
Description: Option 4			
Style: default			
Vertical Alignment Name: SR 347 - Crest			
Description: Over RR			
Style: default			
Input Factor: 1.0000			
		STATION	ELEVATION
Element: Linear			
	BOB	32+00.0000	1175.0000
	PVC	33+00.0000	1175.5000
	Tangent Grade:	0.5000	
	Tangent Length:	100.0000	
Element: Parabola			
	PVC	33+00.0000	1175.5000
	PVI	36+00.0000	1177.0000
	PVT	39+00.0000	1189.0000
	Length:	600.0000	
	Entrance Grade:	0.5000	
	Exit Grade:	4.0000	
	$e = (g2 - g1) / L:$	0.5833	
	$K = 1 / (g2 - g1):$	171.4286	
	Middle Ordinate:	2.8250	
Element: Linear			
	PVI	39+00.0000	1189.0000
	PVC	41+50.0000	1199.0000
	Tangent Grade:	4.0000	
	Tangent Length:	250.0000	
Element: Parabola			
	PVC	41+50.0000	1199.0000
	PVI	45+00.0000	1213.0000
	PVT	48+50.0000	1202.4999
	VHIGH	48+49.9991	1207.0000
	Length:	700.0000	
	Entrance Grade:	4.0000	
	Exit Grade:	-3.0000	
	$e = (g2 - g1) / L:$	-1.0000	
	$K = 1 / (g2 - g1):$	99.9999	
	Middle Ordinate:	-6.1250	
Element: Linear			
	PVT	48+50.0000	1202.4999
	PVC	56+16.6600	1179.5000
	Tangent Grade:	-3.0000	
	Tangent Length:	766.6600	
Element: Parabola			
	PVC	56+16.6600	1179.5000
	PVI	57+66.6600	1175.0000
	PVT	59+16.6600	1174.2500
	Length:	300.0000	
	Entrance Grade:	-3.0000	
	Exit Grade:	-0.5000	
	$e = (g2 - g1) / L:$	0.8333	
	$K = 1 / (g2 - g1):$	119.9999	
	Middle Ordinate:	0.9375	
Element: Linear			
	PVT	59+16.6600	1174.2500
	POB	62+66.6600	1172.5000
	Tangent Grade:	-0.5000	
	Tangent Length:	350.0000	

SR 347 - Draft Feasibility Report										January 10, 2007		HAE		HDR Engineering, Inc.			
SR 347 Vertical Curves & Grades - AASHTO & ADOT Criteria & Methods										One Way Traffic With Station = 1u		One Way Traffic Against Station = 1d		2			
Design Speed = 50 MPH										Two Way Traffic = 2							
PVI Station	PVI Elevation	Grades	AD	C	'84 AASHTO VC Lengths		'01 AASHTO VC Length	'04 ADOT VC Length	Actual VC Length	Actual "k" Factor	Controlling		Corr Factor	'04 ADOT			
					Min	Des					Station	Elev		Actual SSD	Design Speed		
SR 347 (Option 5)																	
11+00.0000	1177.0000	0.5000%									PVC	13+50.00	1178.2500				
15+00.0000	1179.0000		2.5000	S	225	275	240		300	120.0	PVT	16+50.00	1183.5000	0.9375	767	70	
		3.0000%									PVC	21+00.00	1197.0000				
24+50.0000	1207.5000		5.0000	C	550	800	420	461	700	140.0	PVT	28+00.00	1200.5000	-4.3750	550	57	
		-2.0000%									PVC	31+62.50	1193.2500				
34+62.5000	1187.2500		4.0000	S	360	440	384	176	600	150.0	PVT	37+62.50	1193.2500	3.0000	622	62	
		2.0000%									PVC	42+50.00	1203.0000				
46+00.0000	1210.0000		5.0000	C	550	800	420	461	700	140.0	PVT	49+50.00	1199.4999	-4.3750	550	57	
		-3.0000%									PVC	56+16.66	1179.5000				
57+66.6600	1175.0000		2.5000	S	225	275	240		300	120.0	PVT	59+16.66	1174.2500	0.9375	767	72	
		-0.5000%									PVC						
62+66.6600	1172.5000										PVT						
											PVC						
											PVT						
Honeycutt Road (Option 5)																	
30+00.0000	1190.5000										PVT						
		-2.0000%									PVC	37+50.00	1175.5000				
39+00.0000	1172.5000		2.5000	S	225	275	240		300	120.0	PVT	40+50.00	1173.2500	0.9375	767	71	
		0.5000%									PVC						
44+00.0000	1175.0000										PVT						
											PVC						
											PVT						
											PVC						
											PVT						
											PVC						
											PVT						

SR 347 - Draft Feasibility Report										January 10, 2007		HAE		HDR Engineering, Inc. V-12172004		
SR 347 Vertical Curves & Grades - AASHTO & ADOT Criteria & Methods										One Way Traffic With Station = 1u		One Way Traffic Against Station = 1d		2		
Design Speed = 50 MPH										Two Way Traffic = 2						
PVI Station	PVI Elevation	Grades	AD	C S	'84 AASHTO VC Lengths		'01 AASHTO VC Length	'04 ADOT VC Length	Actual VC Length	Actual "k" Factor	Controlling		Corr Factor	'04 ADOT		
					Min	Des					Station	Elev		Actual SSD	Design Speed	
MCG Highway (Option 5)																
56+00.0000	1177.3000	0.5000%									PVC	58+00.00	1178.3000			
60+00.0000	1179.3000		3.5000	S	315	385	336	109	400	114.3	PVT	62+00.00	1187.3000	1.7500	514	54
		4.0000%									PVC	65+05.00	1199.5000			
68+55.0000	1213.5000		7.0000	C	770	1,120	588	670	700	100.0	PVT	72+05.00	1202.9999	-6.1250	465	51
		-3.0000%									PVC	78+50.00	1183.6498			
80+00.0000	1179.1498		2.5000	S	225	275	240		300	120.0	PVT	81+50.00	1178.3998	0.9375	767	70
		-0.5000%									PVC					
83+00.0000	1177.6498										PVT					
											PVC					
											PVT					
											PVC					
											PVT					
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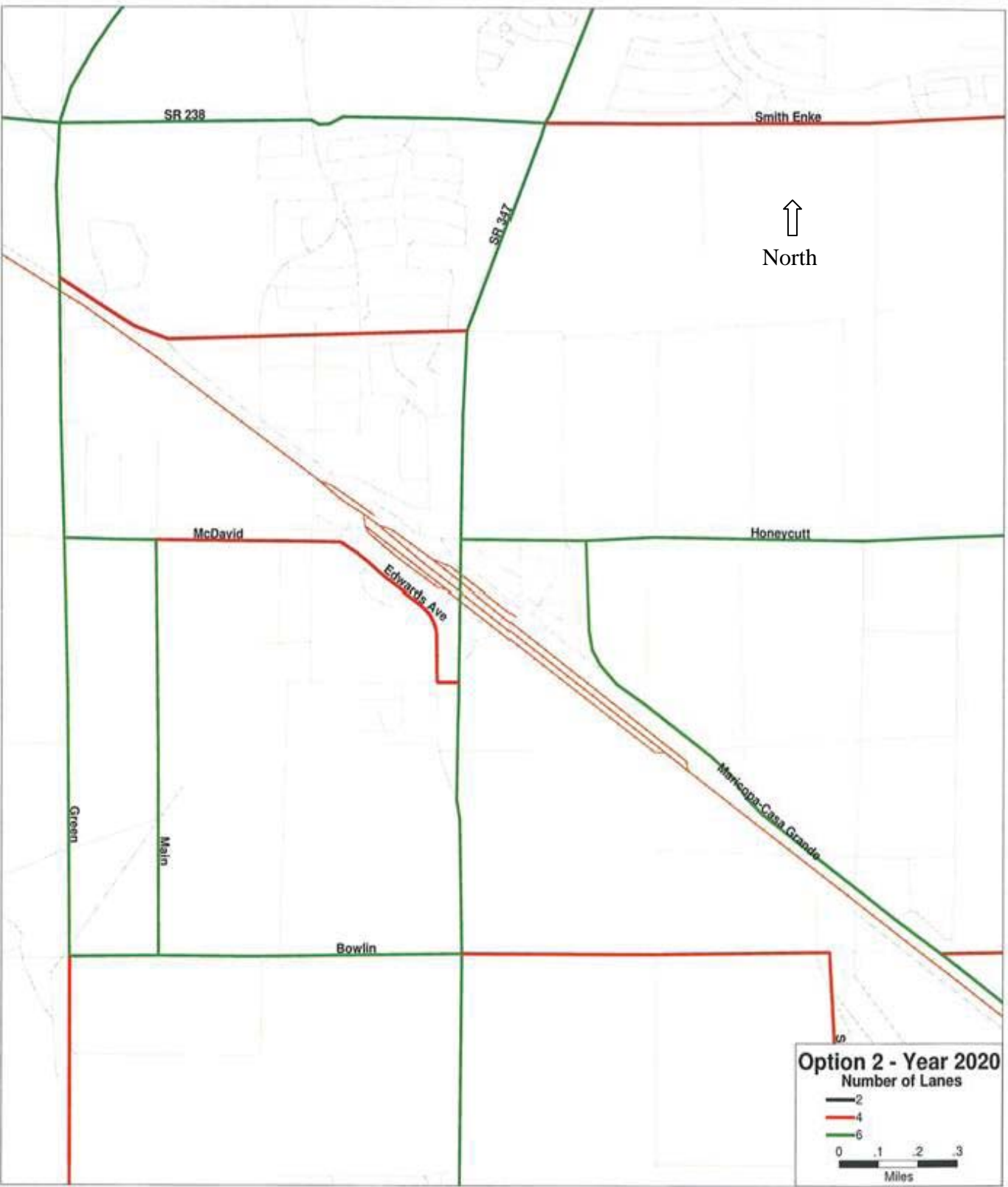
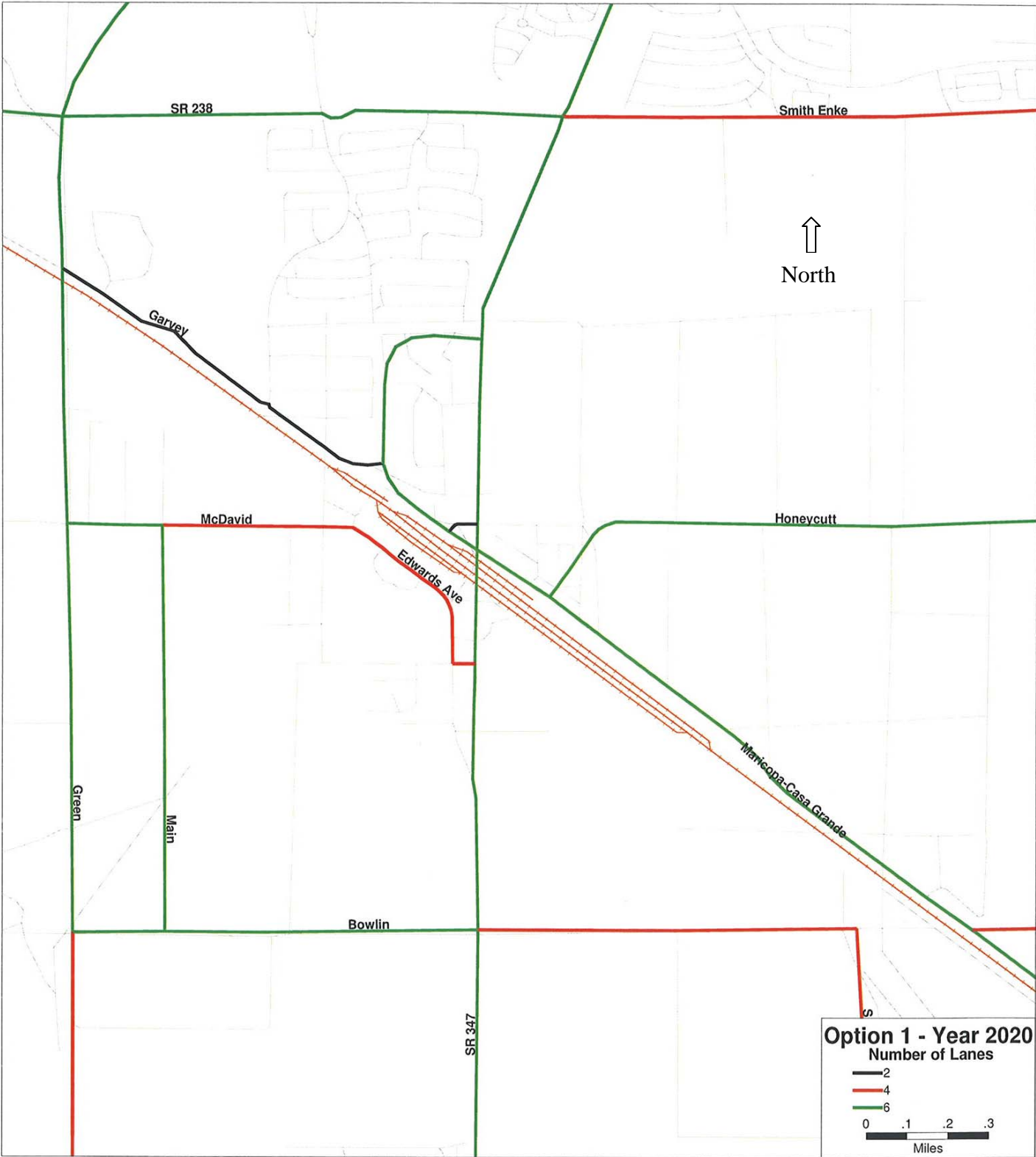
Project Name: Option 5 SR 347 Description: Option 5 Horizontal Alignment Name: SR 347 Description: Option 5 Style: default Vertical Alignment Name: SR 347 - Crest Description: Over RR Style: default Input Factor: 1.0000				Project Name: Option 5 SR 347 Description: Option 5 Horizontal Alignment Name: Honeycutt Rd Description: Option 5 Layout Style: default Vertical Alignment Name: Honeycutt Rd - Crest Description: CL Style: default Input Factor: 1.0000			
		STATION	ELEVATION			STATION	ELEVATION
Element: Linear	POB	11+00.0000	1177.0000	Element: Linear	POB	50+00.0000	1190.5000
	PVC	13+50.0000	1178.2500		PVC	57+50.0000	1175.5000
	Tangent Grade:	0.5000			Tangent Grade:	-2.0000	
	Tangent Length:	250.0000			Tangent Length:	750.0000	
Element: Parabola	PVC	13+50.0000	1178.2500	Element: Parabola	PVC	57+50.0000	1175.5000
	PVI	15+00.0000	1179.0000		PVI	59+00.0000	1172.5000
	PVT	16+50.0000	1183.5000		PVT	60+50.0000	1173.2500
	Length:	300.0000			VLOW	59+90.0000	1173.1000
	Entrance Grade:	0.5000			Length:	300.0000	
	Exit Grade:	3.0000			Entrance Grade:	-2.0000	
	$r = (g2 - g1) / L:$	0.8333			Exit Grade:	0.5000	
	$K = 1 / (g2 - g1):$	120.0000			$r = (g2 - g1) / L:$	0.8333	
	Middle Ordinate:	0.9375			$K = 1 / (g2 - g1):$	120.0000	
Element: Linear	PVT	16+50.0000	1183.5000		Middle Ordinate:	0.9375	
	PVC	21+00.0000	1197.0000	Element: Linear	PVT	60+50.0000	1173.2500
	Tangent Grade:	3.0000			POE	64+00.0000	1175.0000
	Tangent Length:	450.0000			Tangent Grade:	0.5000	
Element: Parabola	PVC	21+00.0000	1197.0000		Tangent Length:	350.0000	
	PVI	24+50.0000	1207.5000				
	PVT	28+00.0000	1200.5000				
	VHIGH	25+20.0000	1203.3000				
	Length:	700.0000					
	Entrance Grade:	3.0000					
	Exit Grade:	-2.0000					
	$r = (g2 - g1) / L:$	-0.7143					
	$K = 1 / (g2 - g1):$	140.0000					
	Middle Ordinate:	-4.3750					
Element: Linear	PVT	28+00.0000	1200.5000				
	PVC	31+62.5000	1193.2500				
	Tangent Grade:	-2.0000					
	Tangent Length:	362.5000					
Element: Parabola	PVC	31+62.5000	1193.2500				
	PVI	34+62.5000	1107.2500				
	PVT	37+62.5000	1193.2500				
	VLOW	34+62.5000	1190.2500				
	Length:	600.0000					
	Entrance Grade:	-2.0000					
	Exit Grade:	2.0000					
	$r = (g2 - g1) / L:$	0.6667					
	$K = 1 / (g2 - g1):$	150.0000					
	Middle Ordinate:	3.0000					
Element: Linear	PVT	37+62.5000	1193.2500				
	PVC	42+50.0000	1203.0000				
	Tangent Grade:	2.0000					
	Tangent Length:	487.5000					
Element: Parabola	PVC	42+50.0000	1203.0000				
	PVI	46+00.0000	1210.0000				
	PVT	49+50.0000	1199.4999				
	VHIGH	45+29.9990	1205.8000				

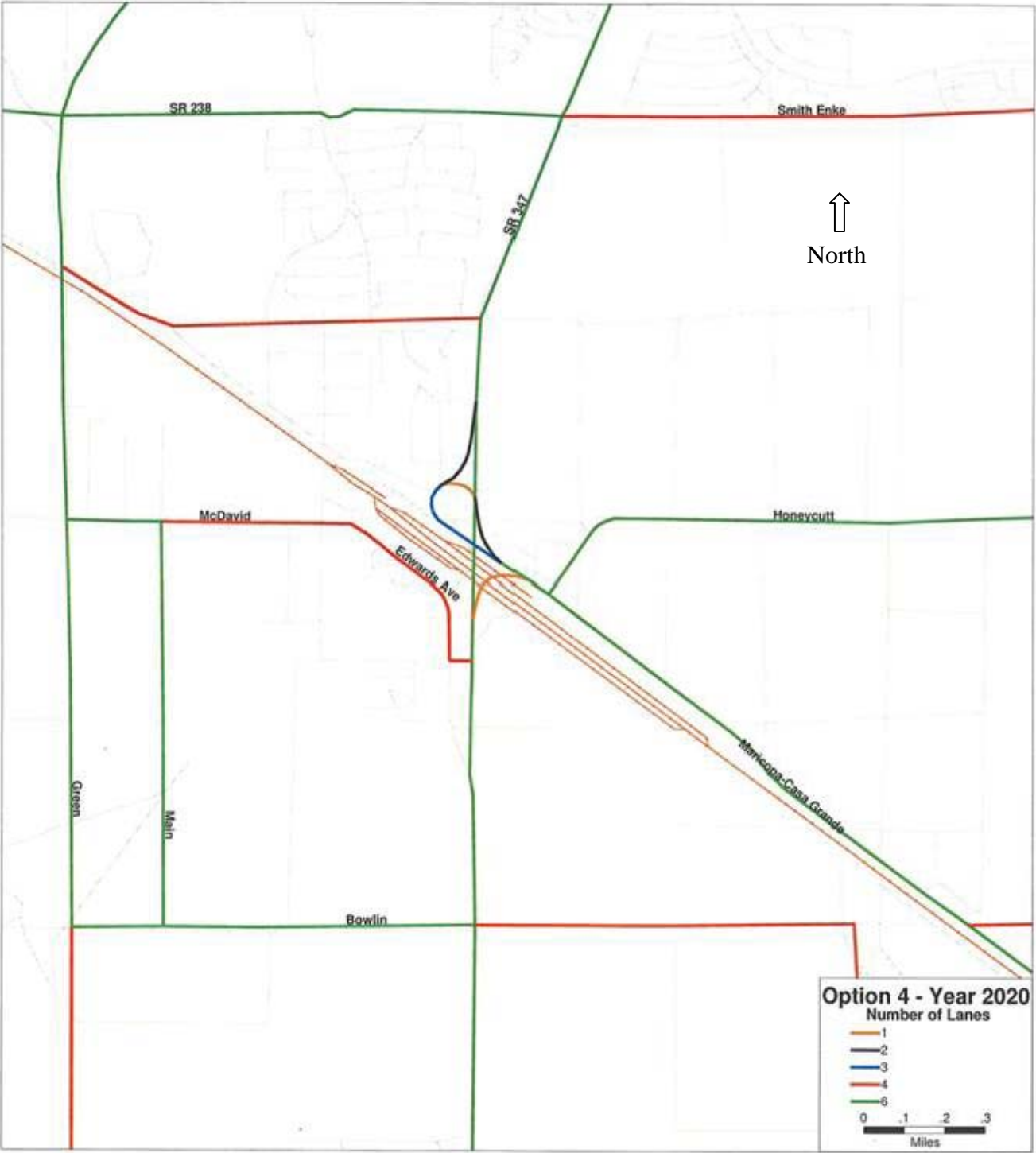
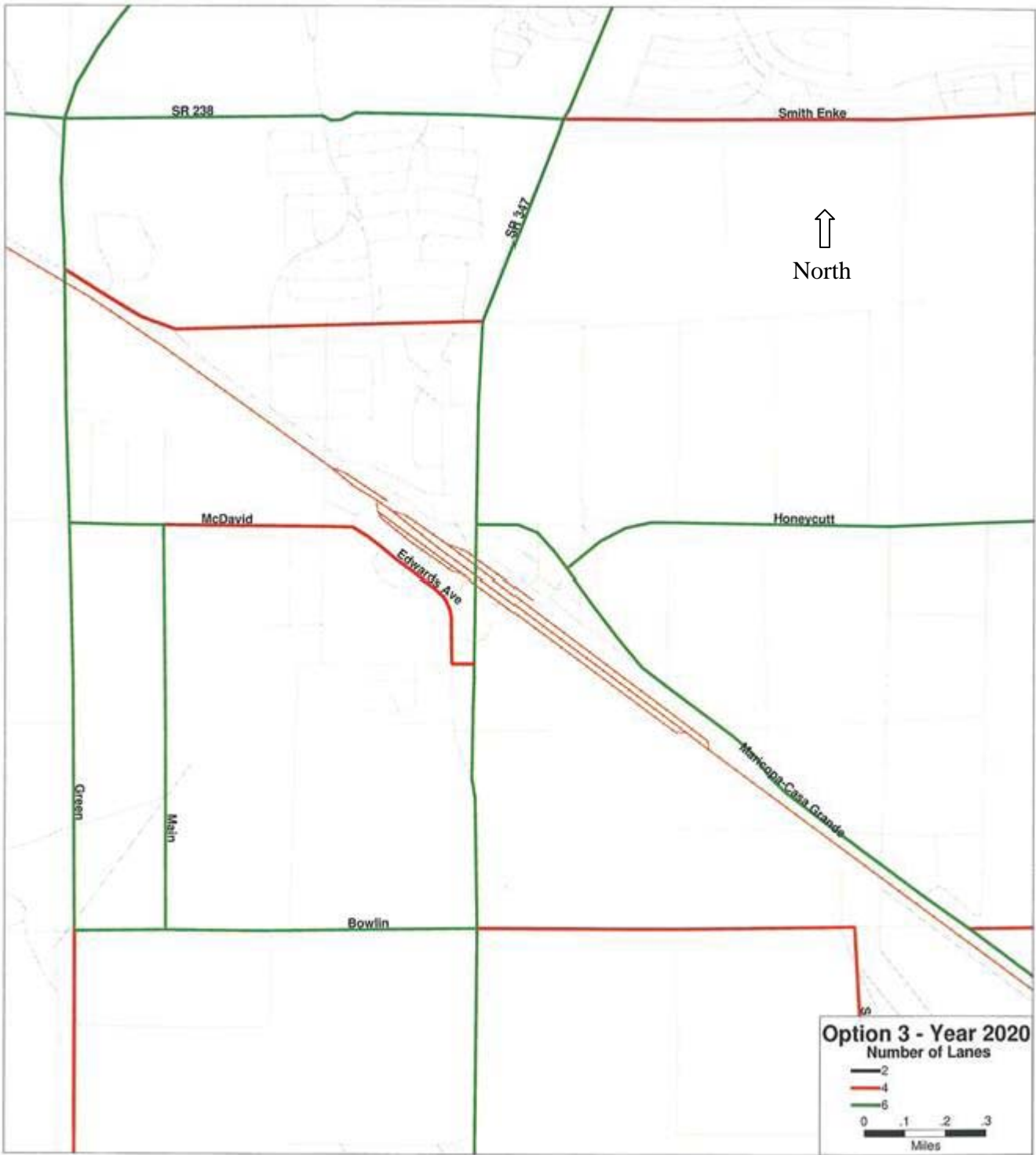
Project Name: Option 5 SR 347			
Description: Option 5			
Horizontal Alignment Name: Edwards / MCG Highway			
Description: Option 5			
Style: default			
Vertical Alignment Name: MCG Highway			
Description: Over RR			
Style: default			
Input Factor: 1.0000			
		STATION	ELEVATION
Element: Linear			
POB		56+00.0000	1177.3000
PVC		58+00.0000	1178.3000
Tangent Grade:		0.5000	
Tangent Length:		200.0000	
Element: Parabola			
PVC		58+00.0000	1178.3000
PVI		60+00.0000	1179.3000
PVT		62+00.0000	1187.3000
Length:		400.0000	
Entrance Grade:		0.5000	
Exit Grade:		4.0000	
r = (g2 - g1) / L:		0.8750	
K = 1 / (g2 - g1):		114.2857	
Middle Ordinate:		1.7500	
Element: Linear			
PVT		62+00.0000	1187.3000
PVC		65+05.0000	1199.5000
Tangent Grade:		4.0000	
Tangent Length:		305.0000	
Element: Parabola			
PVC		65+05.0000	1199.5000
PVI		68+55.0000	1213.5000
PVT		72+05.0000	1202.9999
VHIGH		69+04.9991	1207.5000
Length:		700.0000	
Entrance Grade:		4.0000	
Exit Grade:		-3.0000	
r = (g2 - g1) / L:		-1.0000	
K = 1 / (g2 - g1):		99.9998	
Middle Ordinate:		-6.1250	
Element: Linear			
PVT		72+05.0000	1202.9999
PVC		78+50.0000	1183.6498
Tangent Grade:		-3.0000	
Tangent Length:		645.0000	
Element: Parabola			
PVC		78+50.0000	1183.6498
PVI		80+00.0000	1179.1498
PVT		81+50.0000	1178.3998
Length:		300.0000	
Entrance Grade:		-3.0000	
Exit Grade:		-0.5000	
r = (g2 - g1) / L:		0.8333	
K = 1 / (g2 - g1):		119.9992	
Middle Ordinate:		0.9375	
Element: Linear			
PVT		81+50.0000	1178.3998
POE		83+00.0000	1177.6498
Tangent Grade:		-0.5000	
Tangent Length:		150.0000	

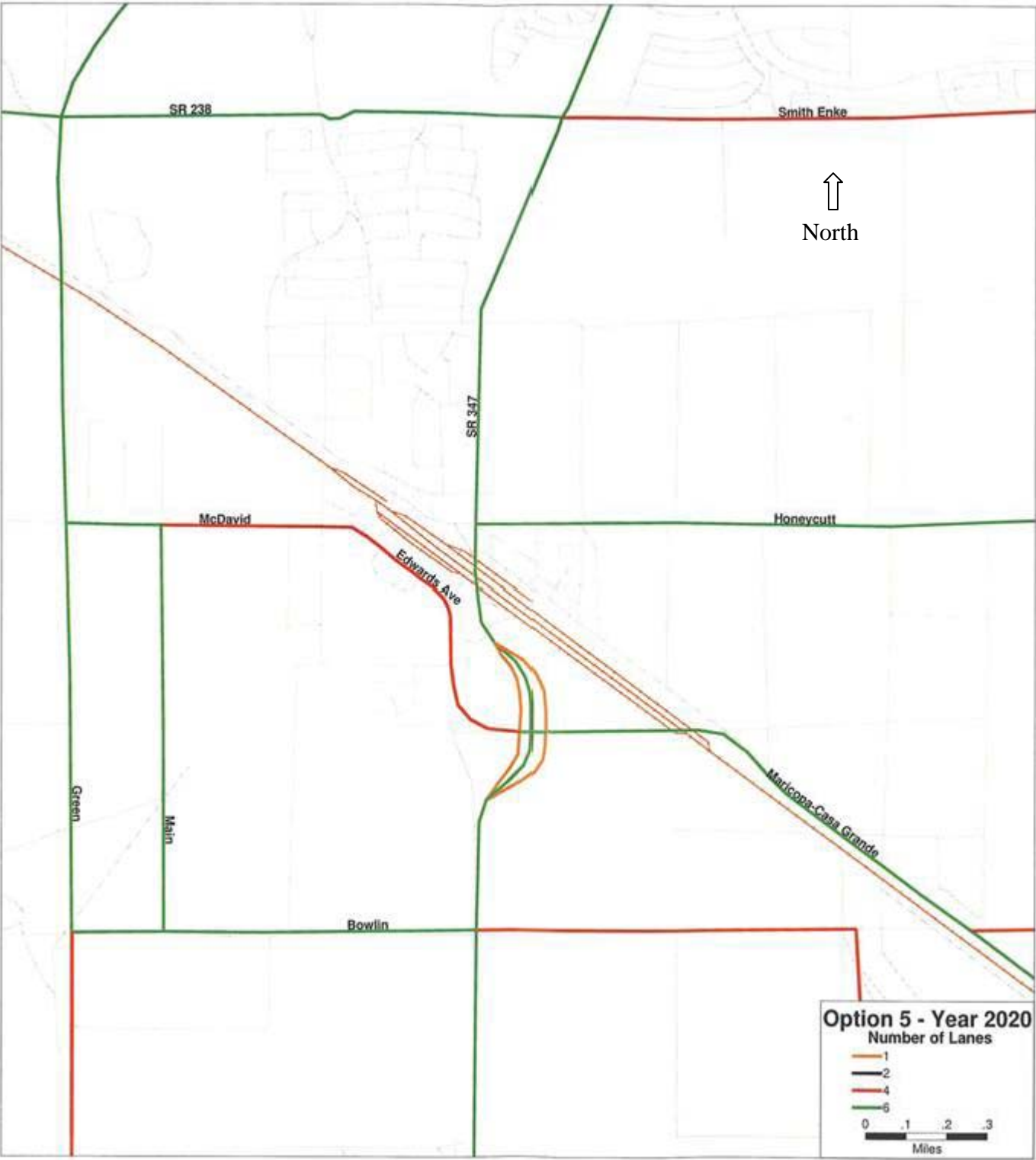
APPENDIX B

Traffic DataPage 1 - 4

Note regarding graphics: The traffic (number of lanes) graphics in this section are schematic and do not accurately show the number of rail lines in the vicinity of SR 347. The rail lines at this location include one through line and a siding west of SR 347; a second through line is to be added within the next two years.





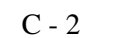


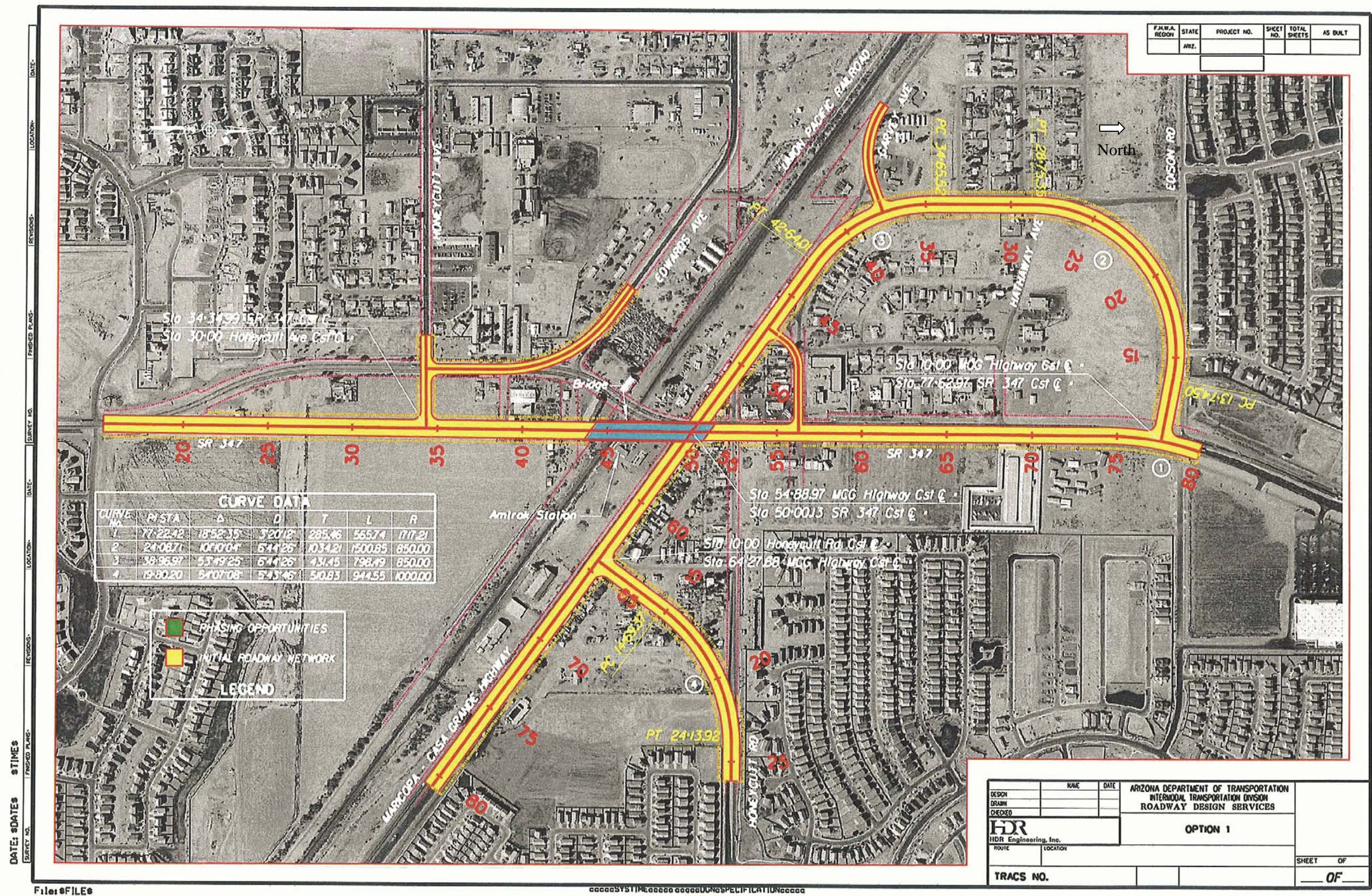
APPENDIX C

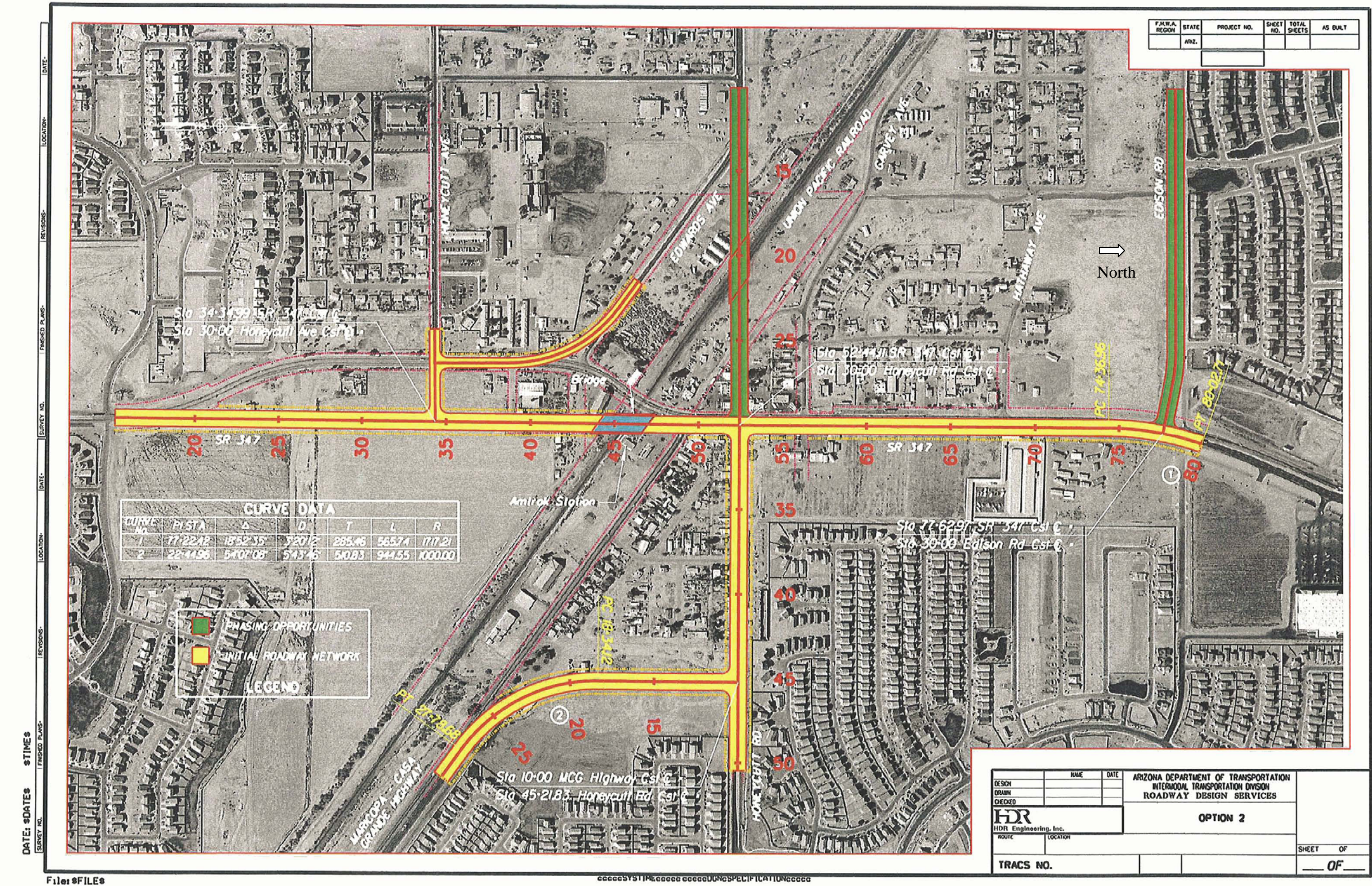
Plans, Typical Sets, Bridge Sheets.....Page 1 - 16

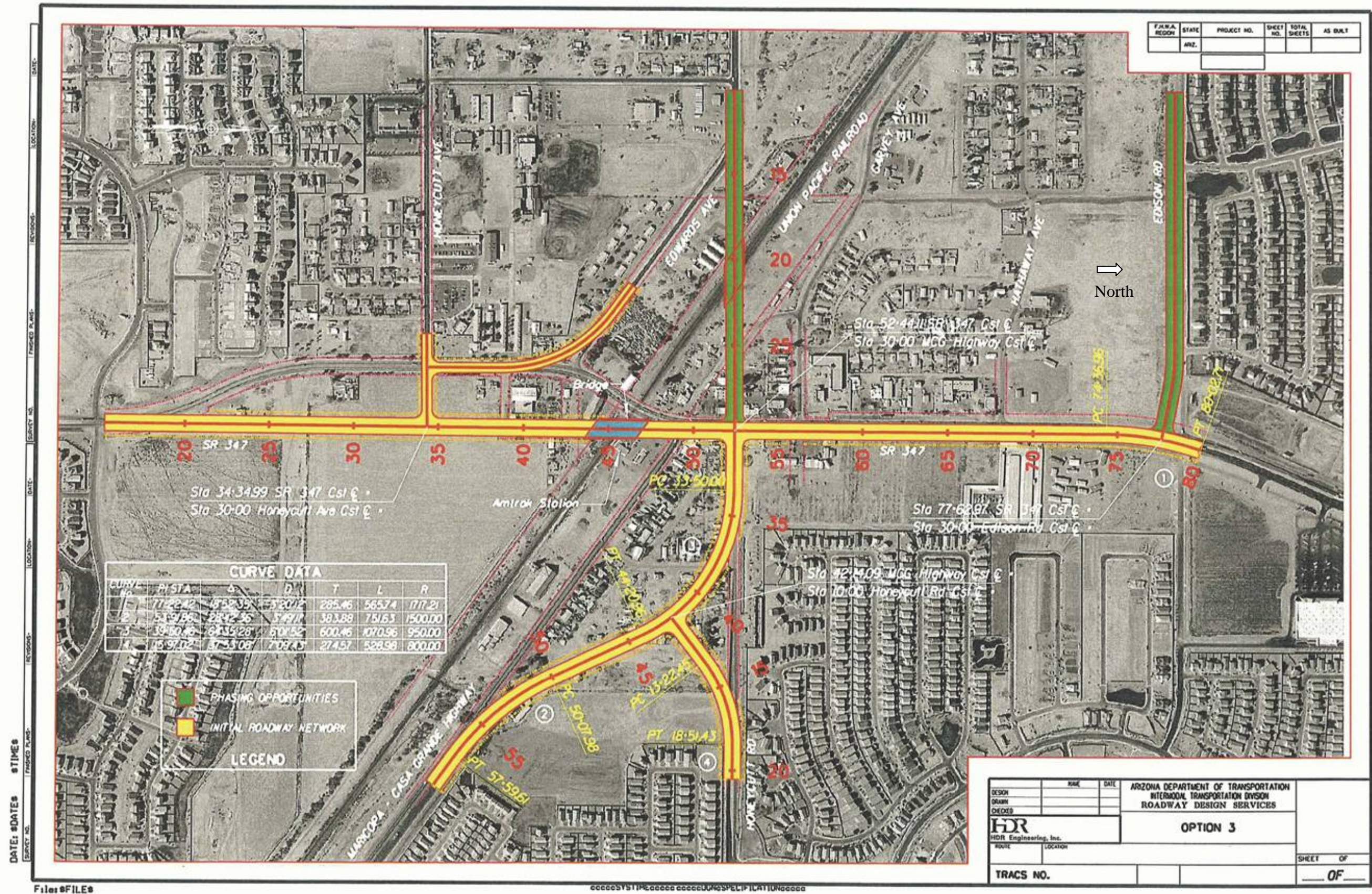
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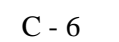
- 1. Roadway alignments shown on plan sheets are schematic. Actual alignments, e.g. of SR 347, may be offset from the existing roadway for constructability and maintenance of traffic.
- 2. References to Option 2B are for the SR 347 under UPRR concept for Option 2. This same concept may be applicable for Options 3 and 5.

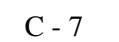


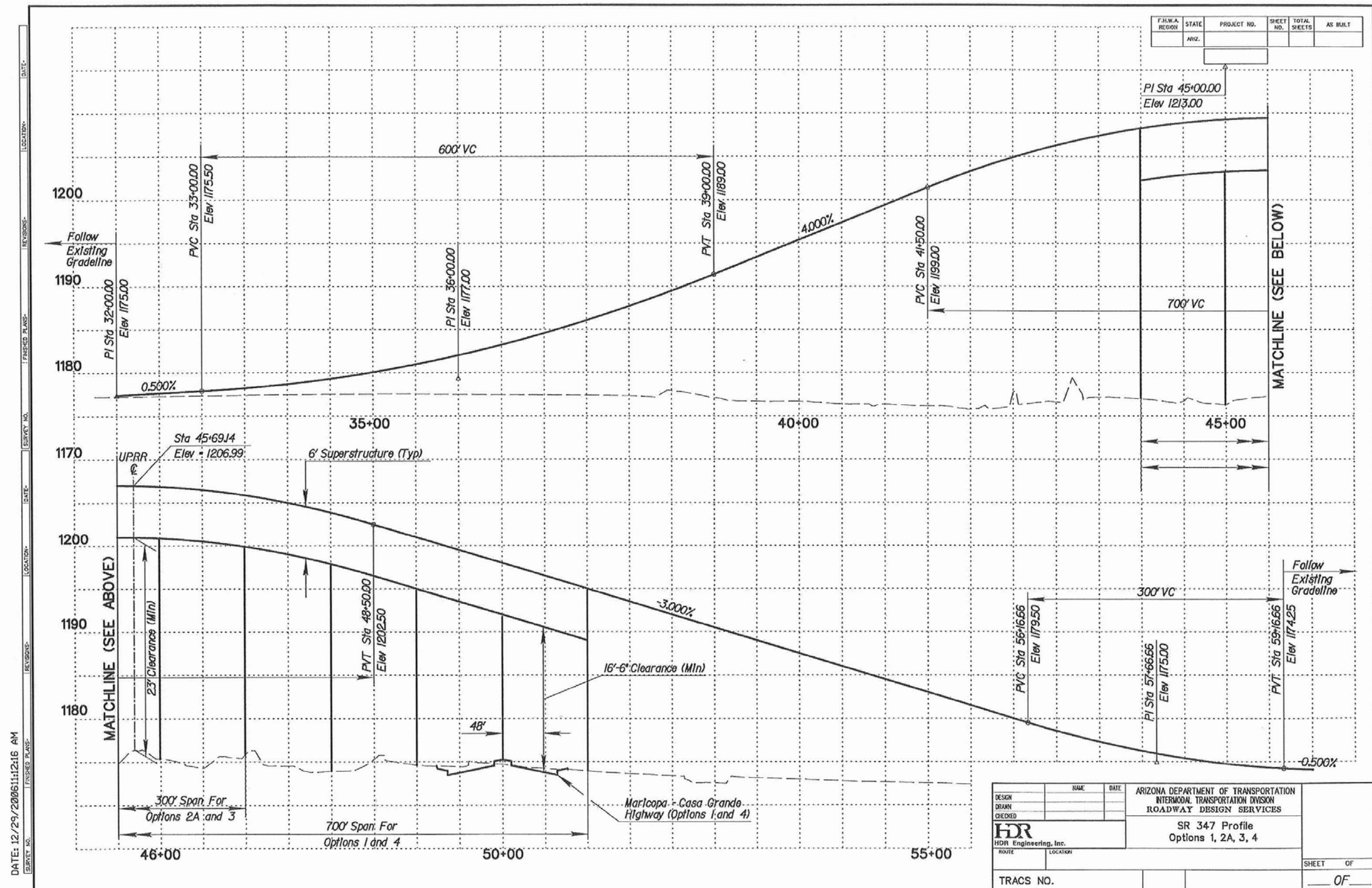


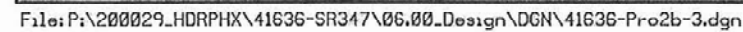


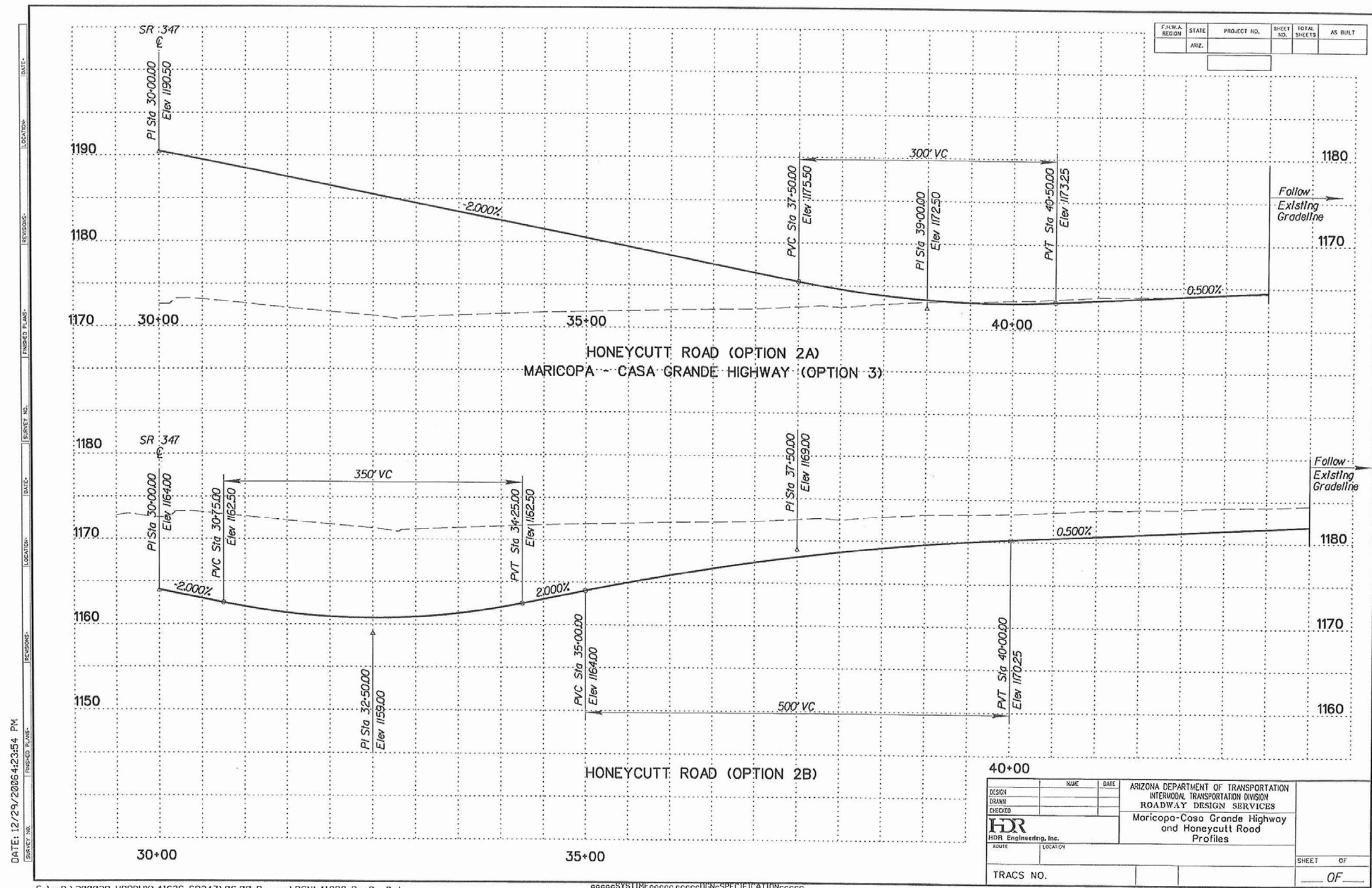


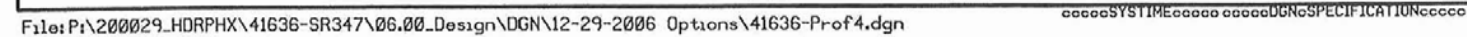


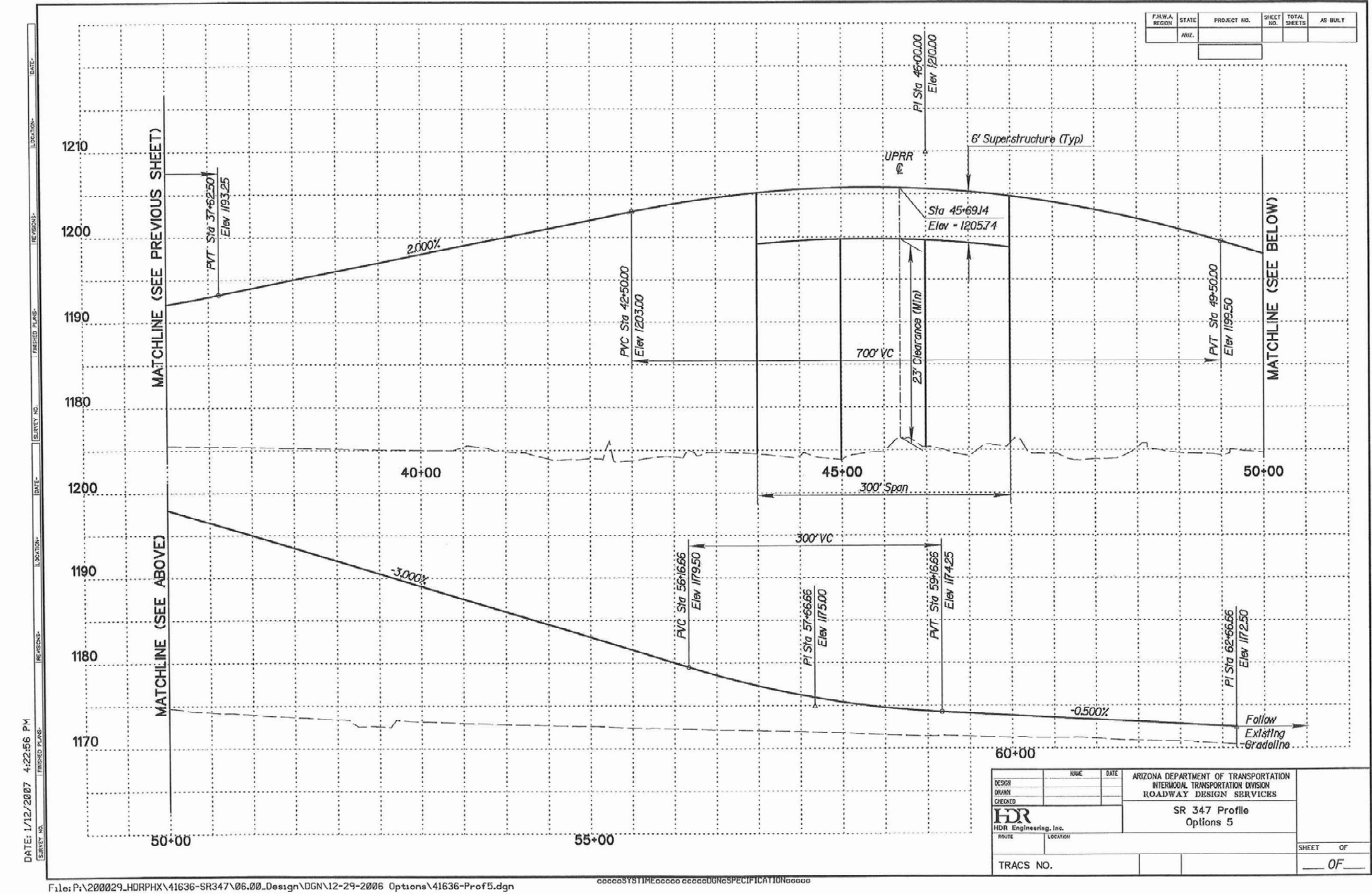


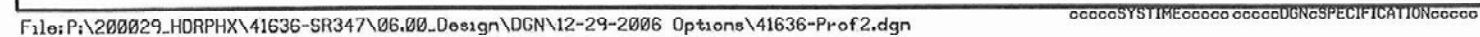


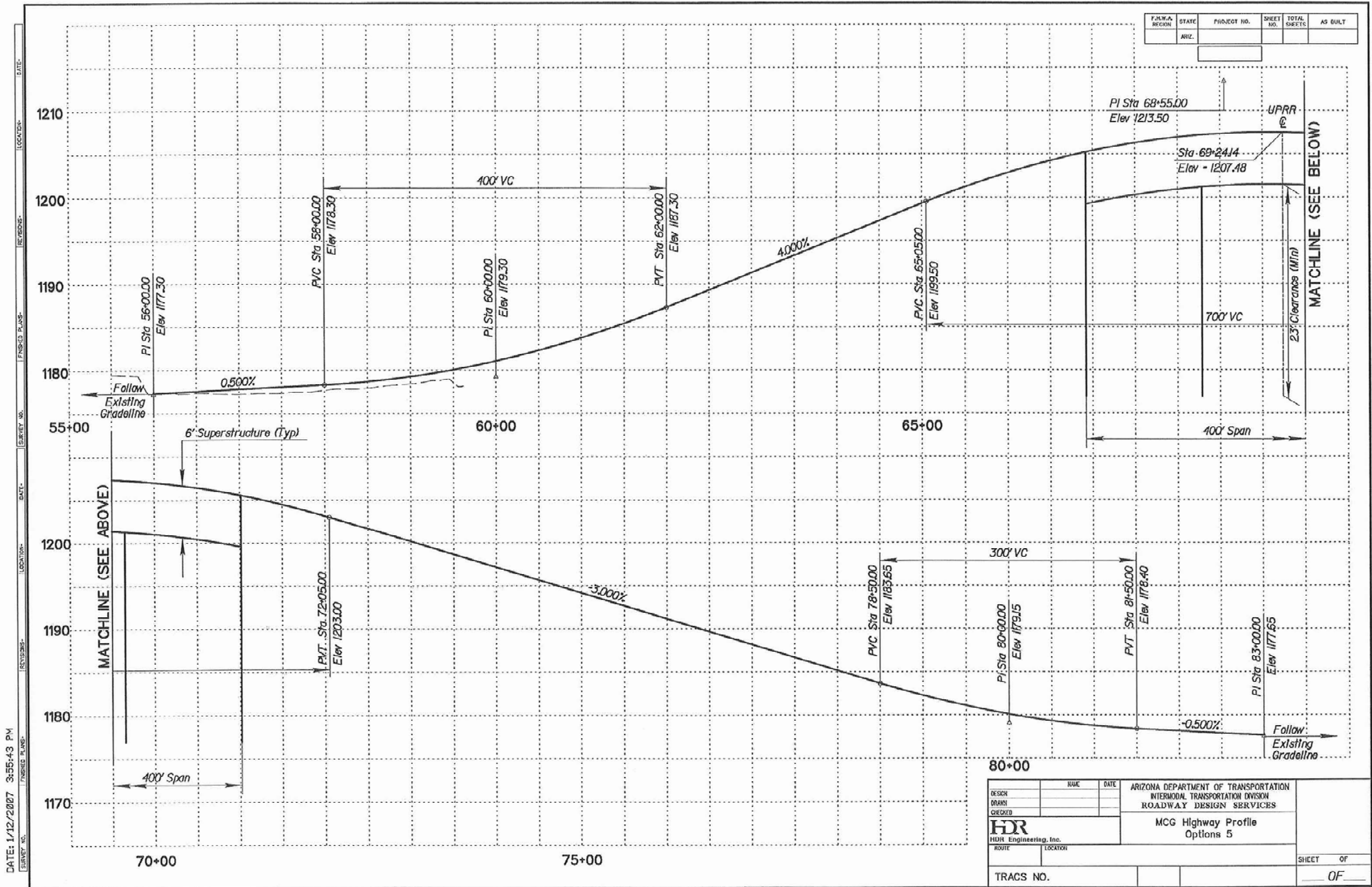




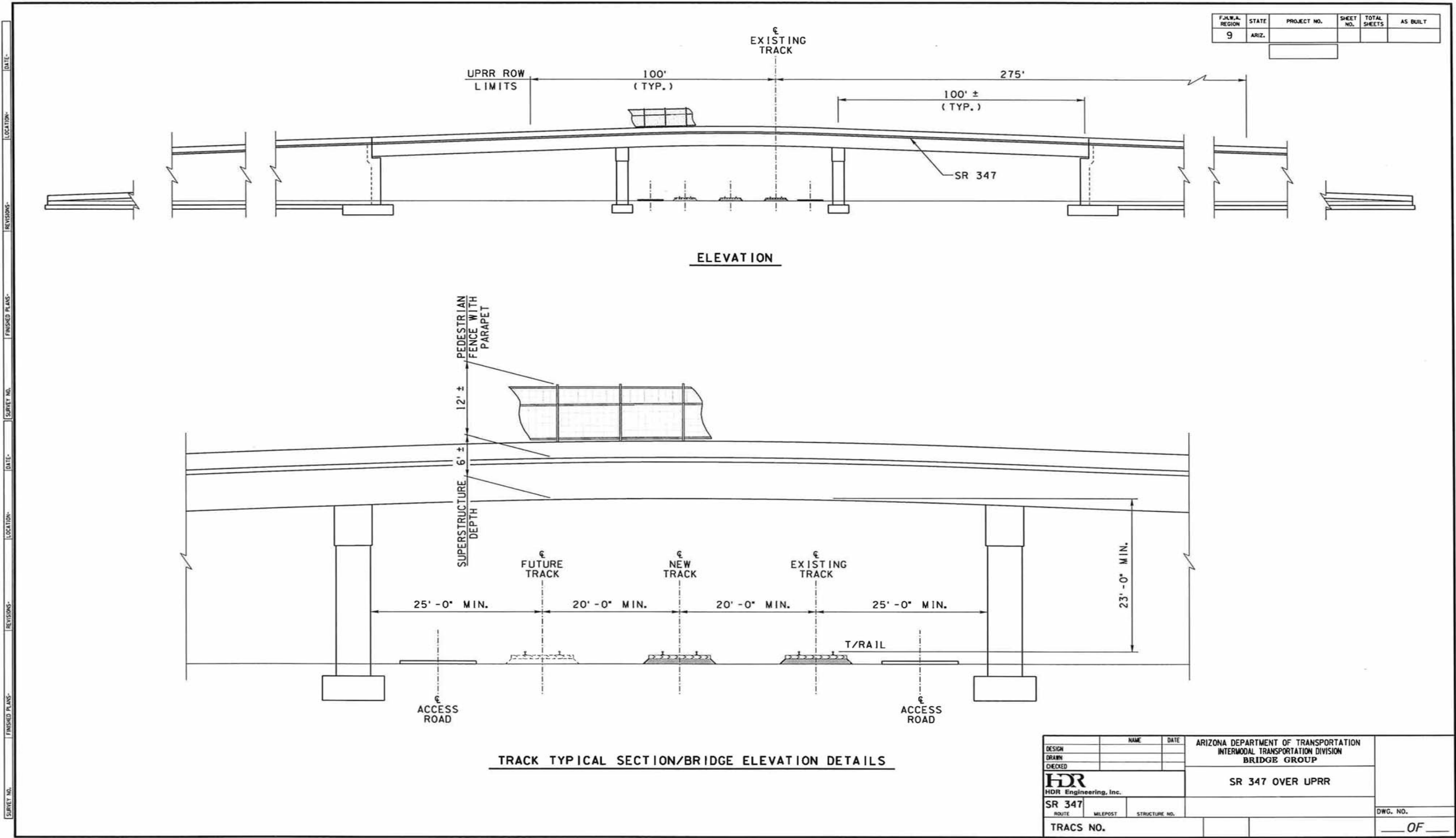


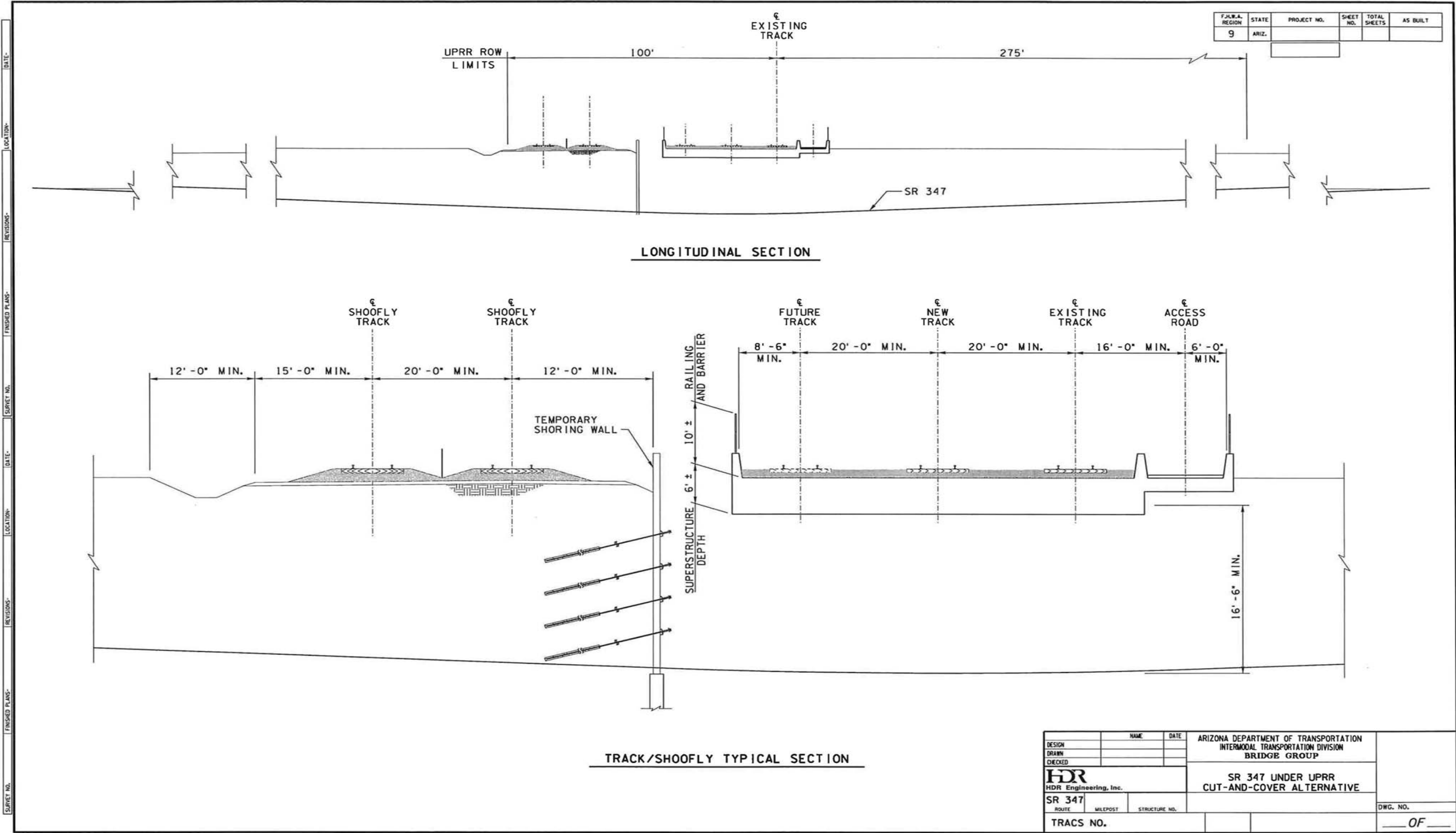






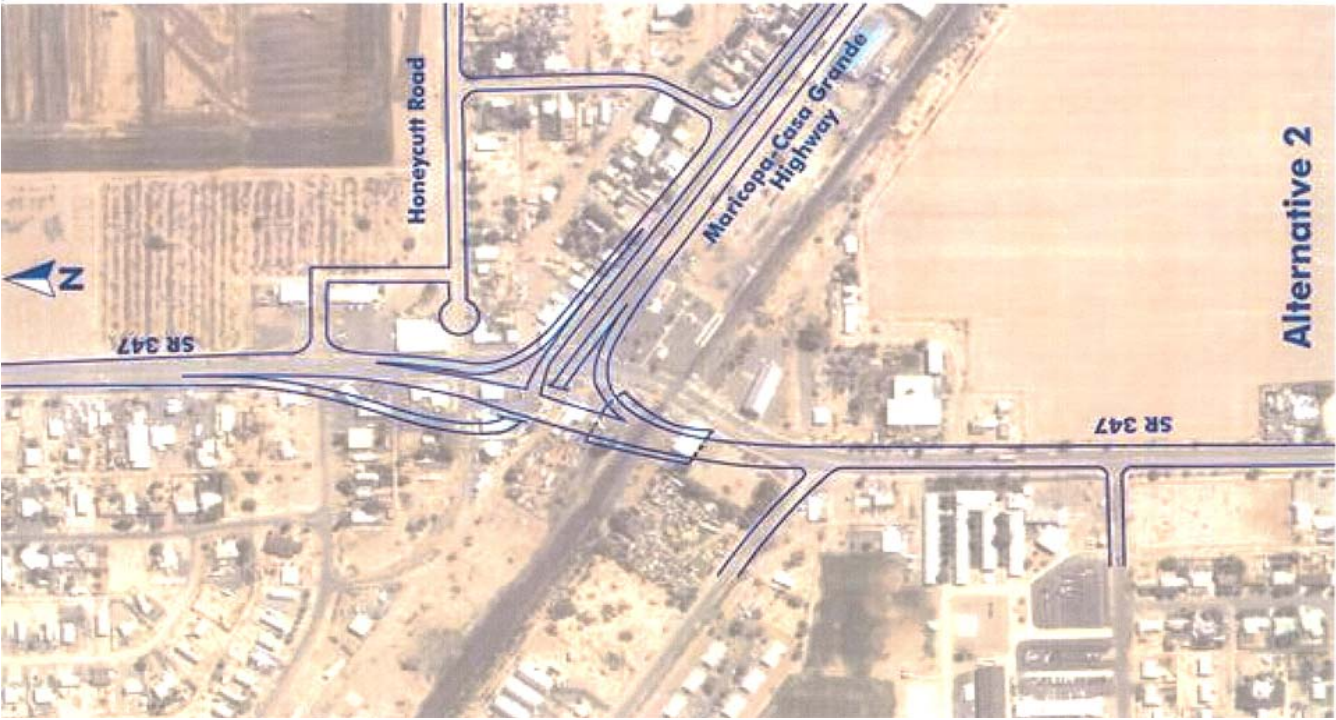
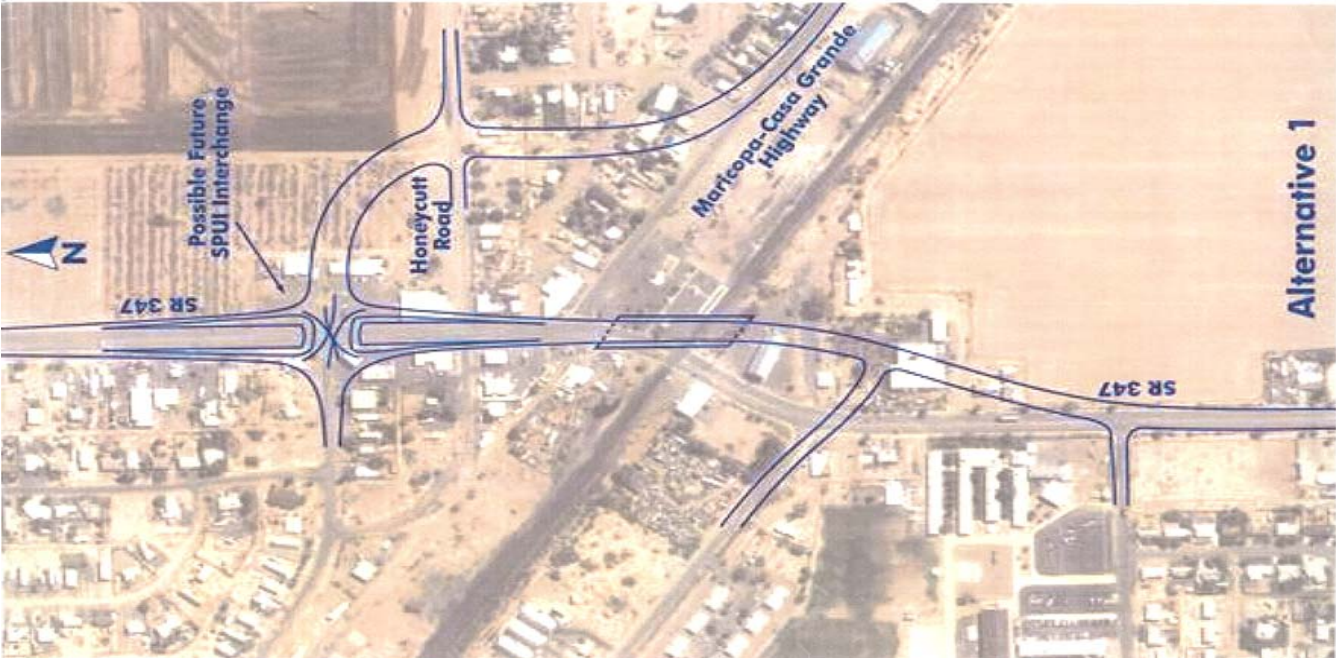
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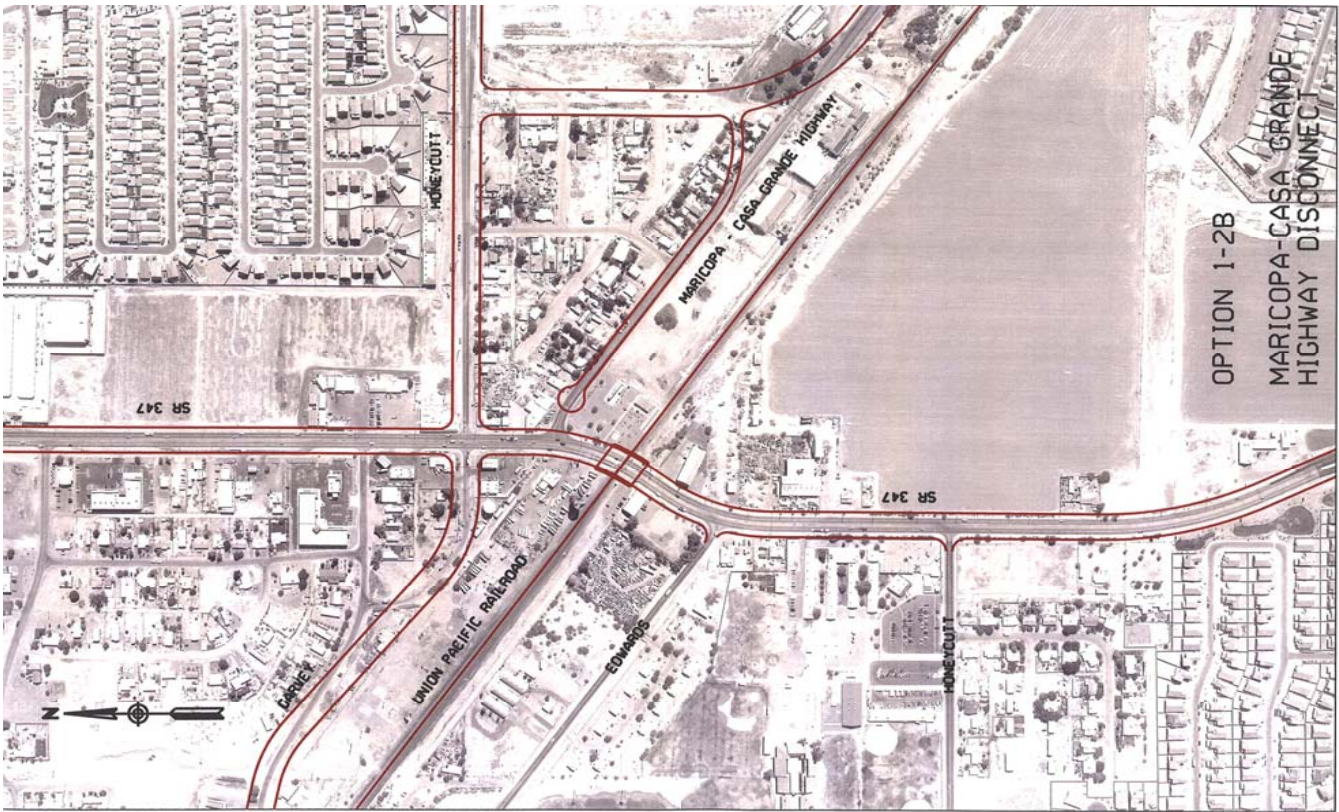
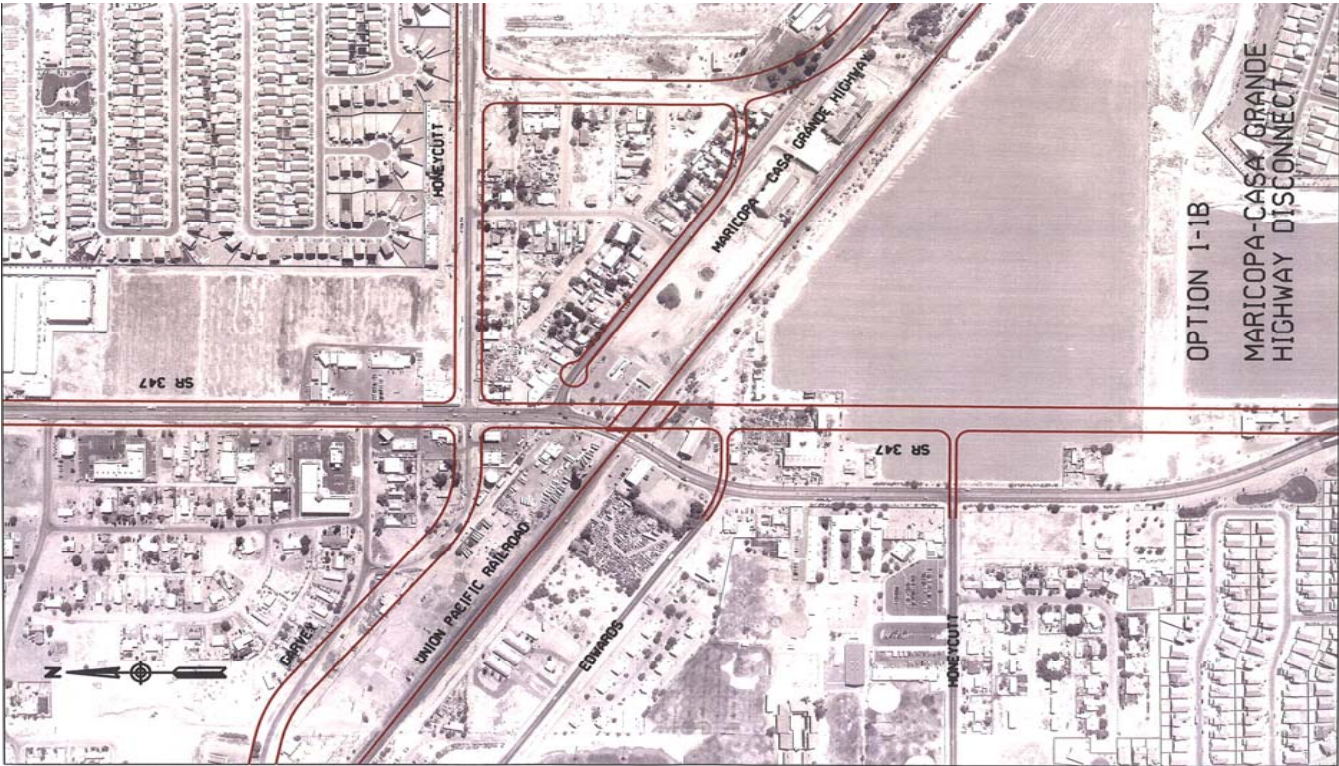
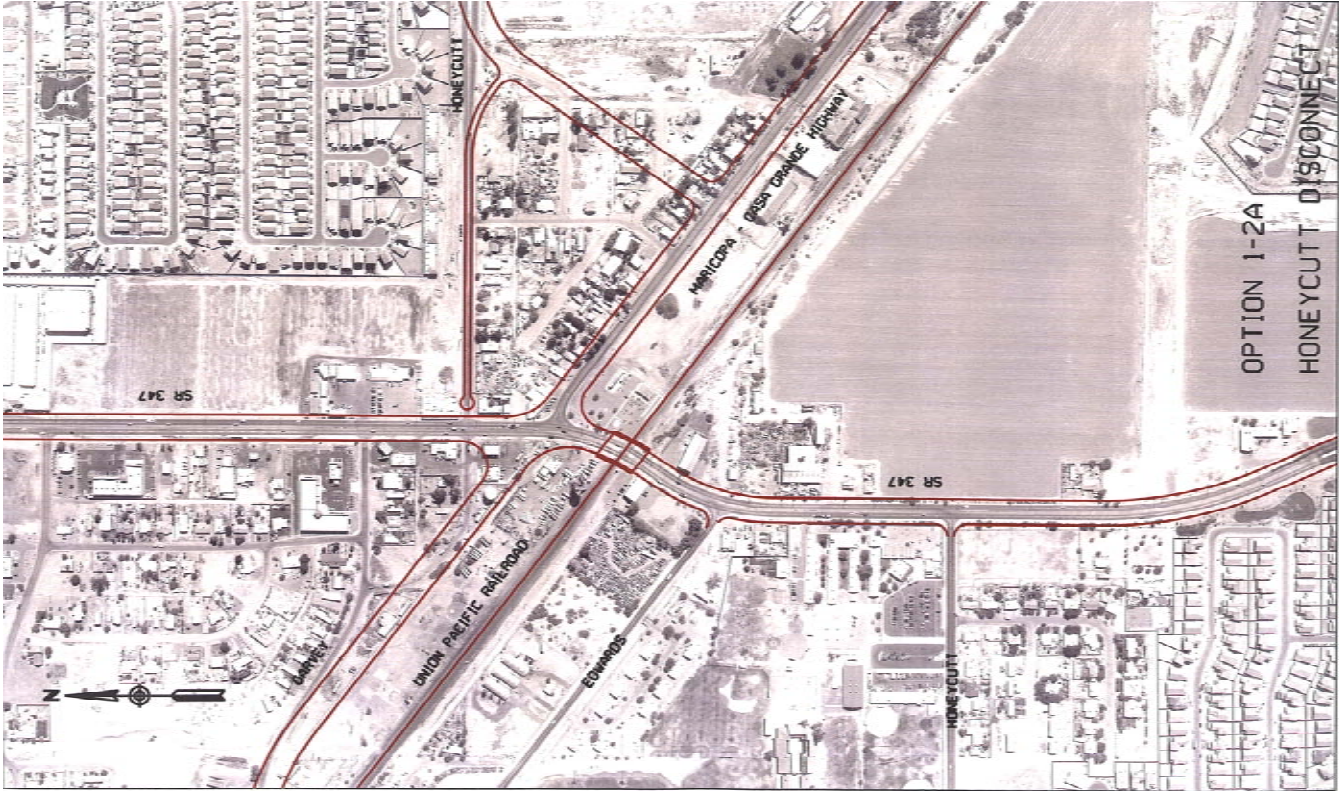
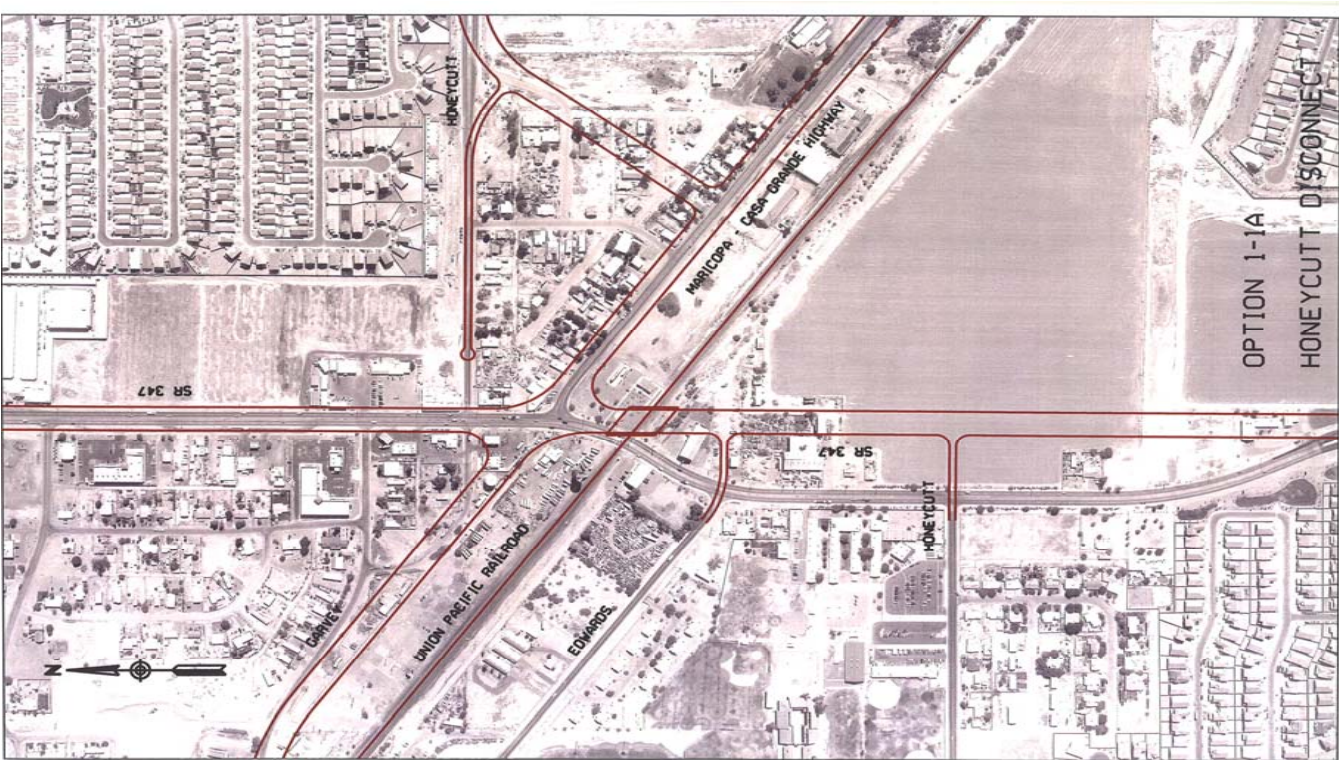


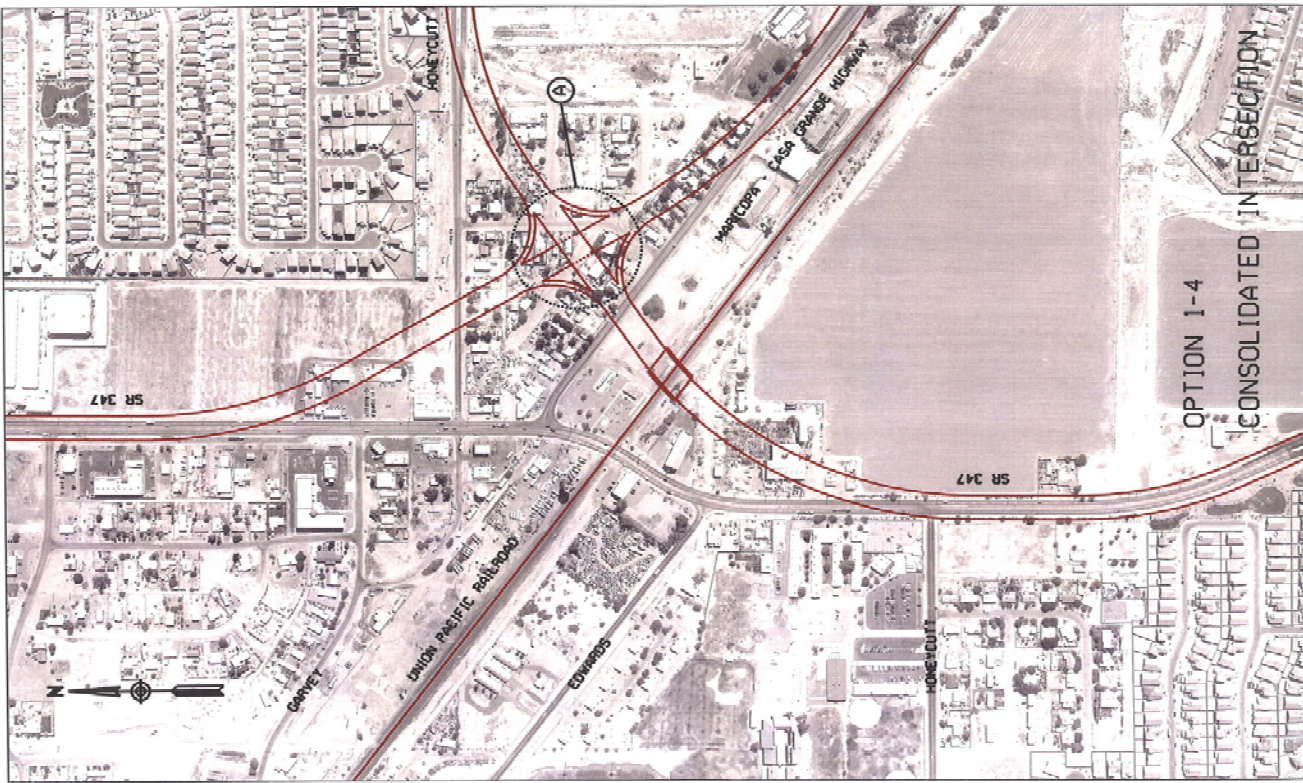
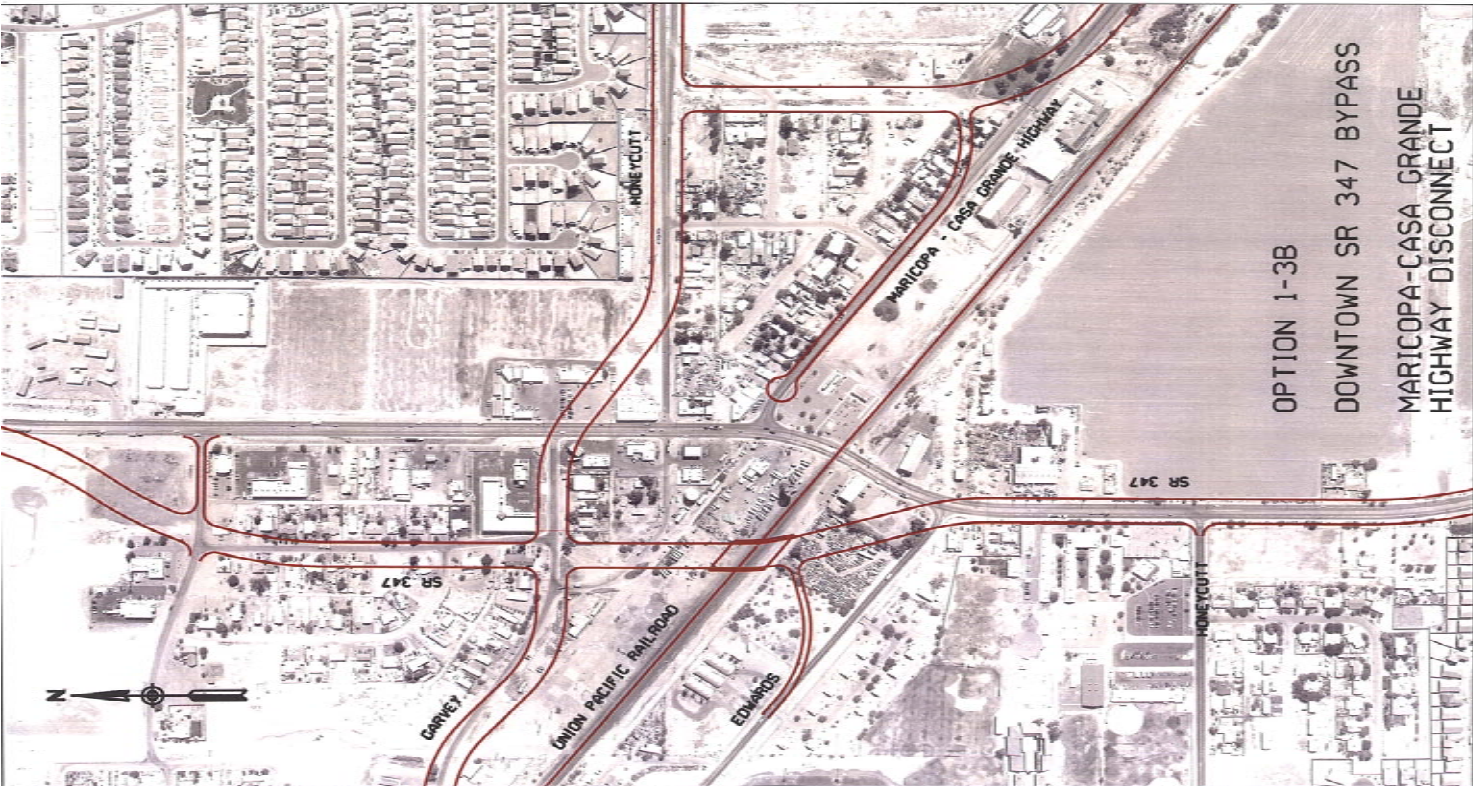
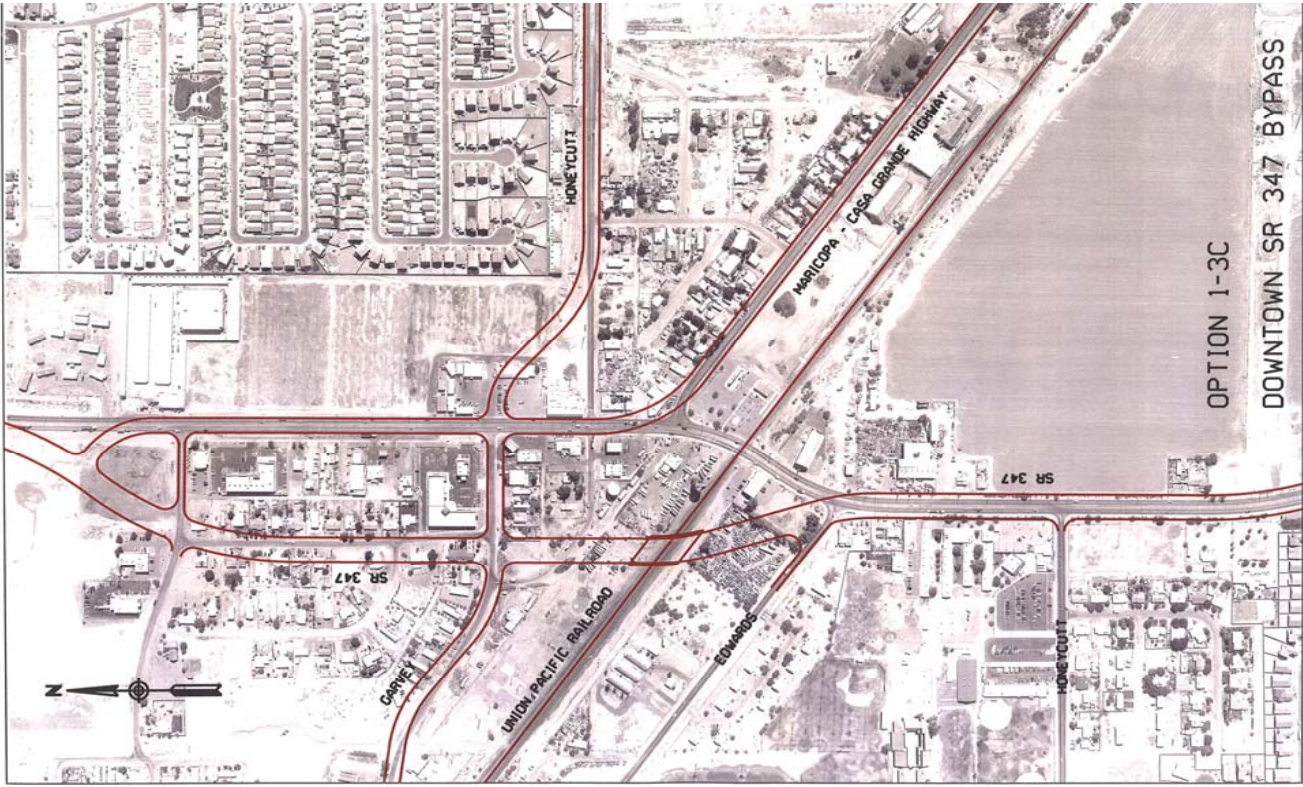
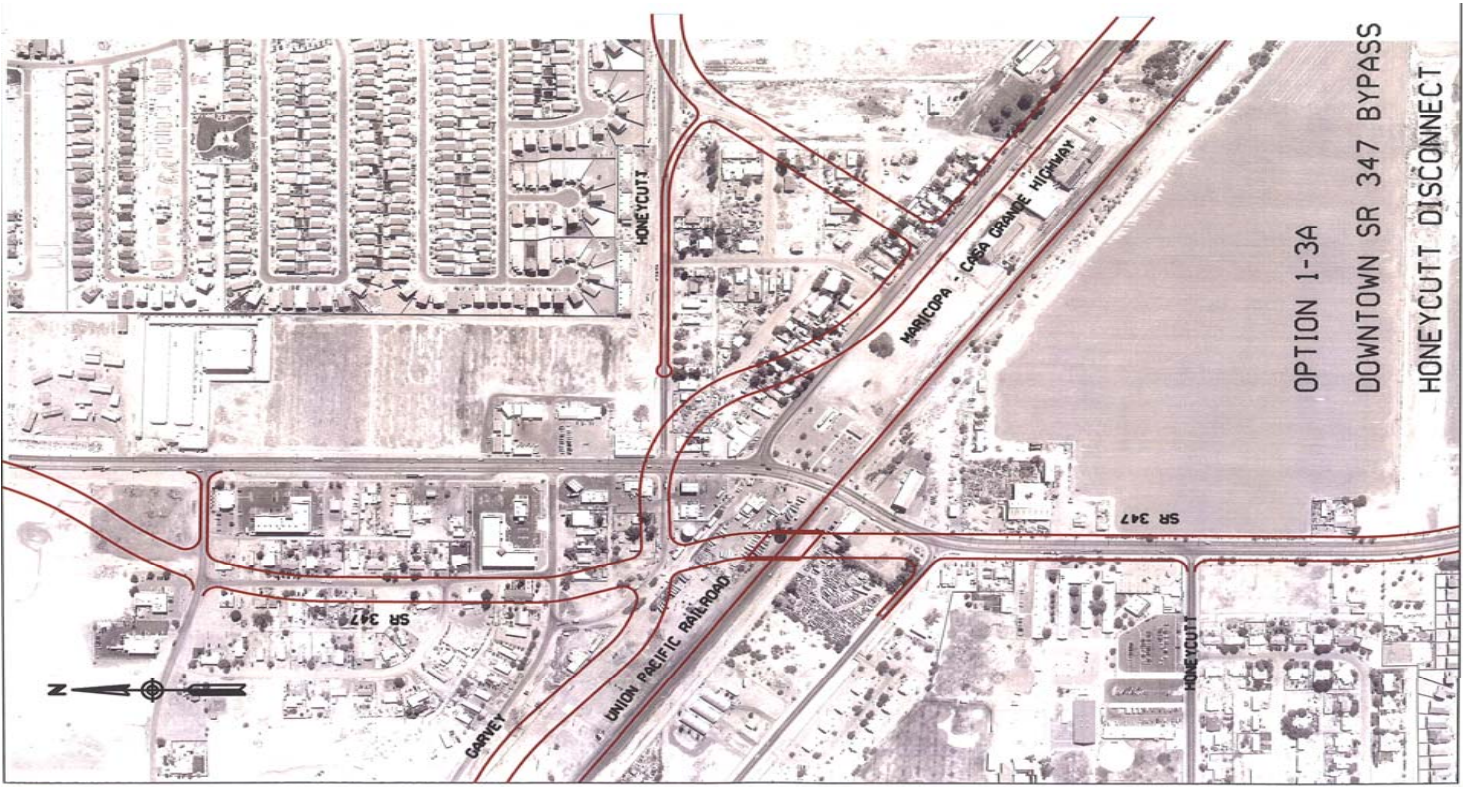


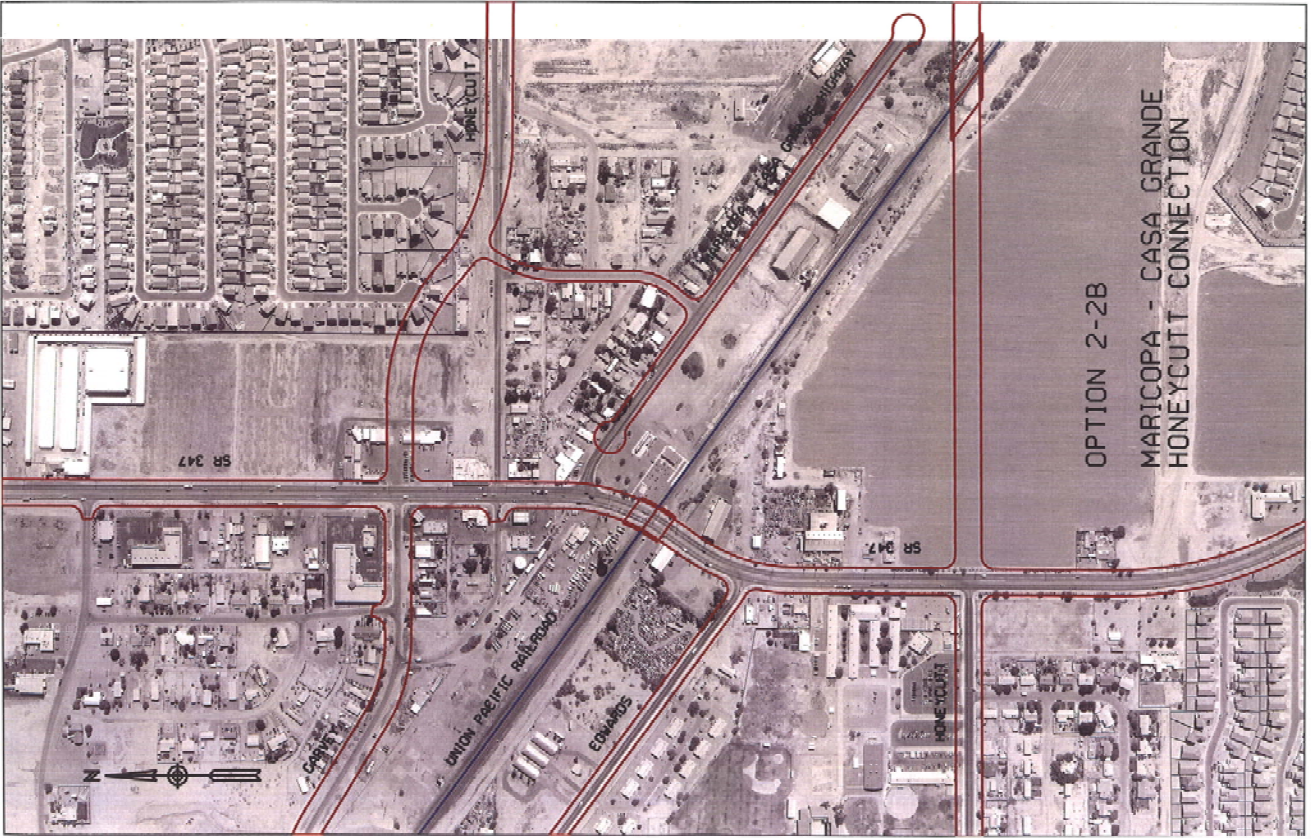
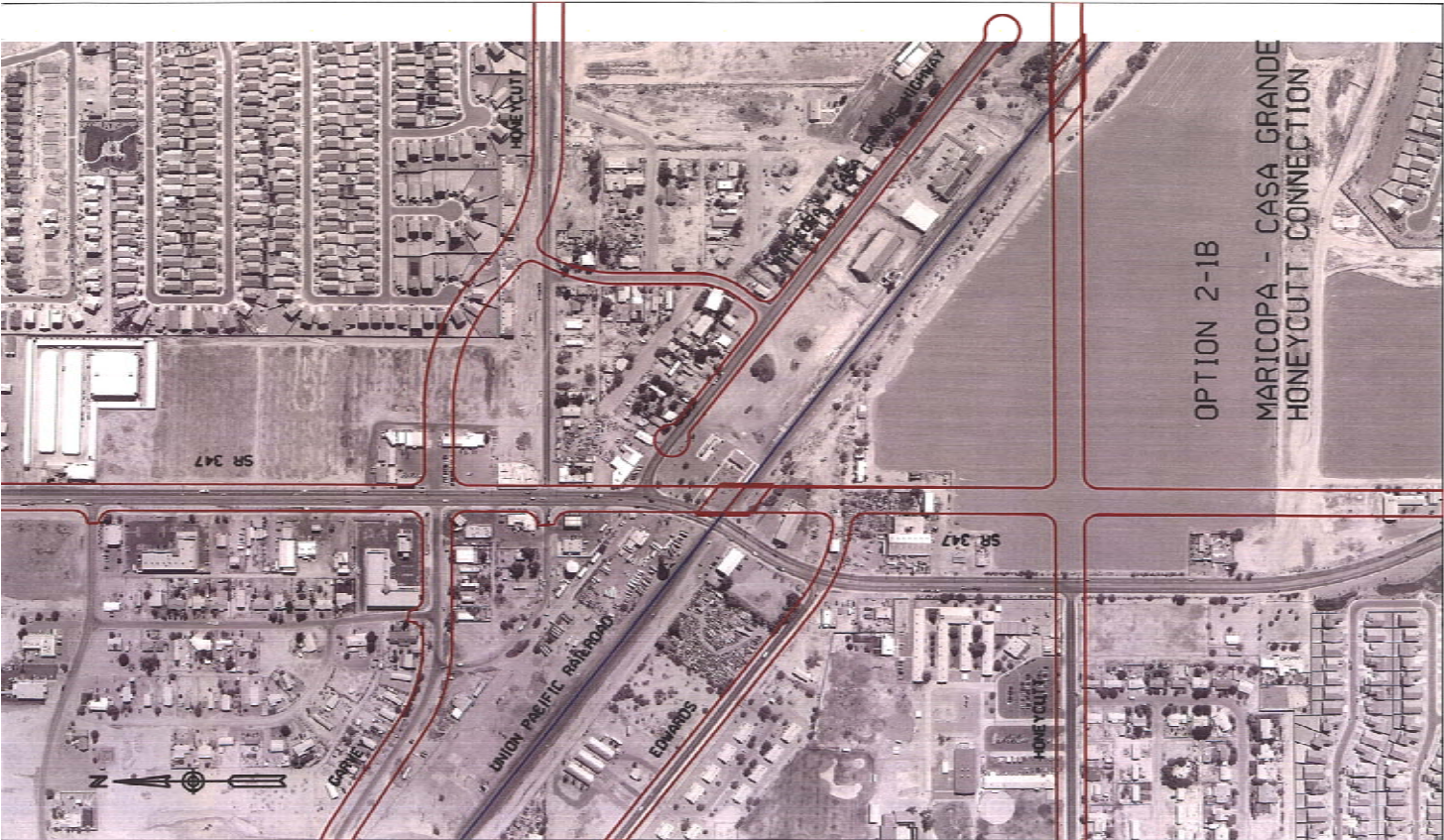
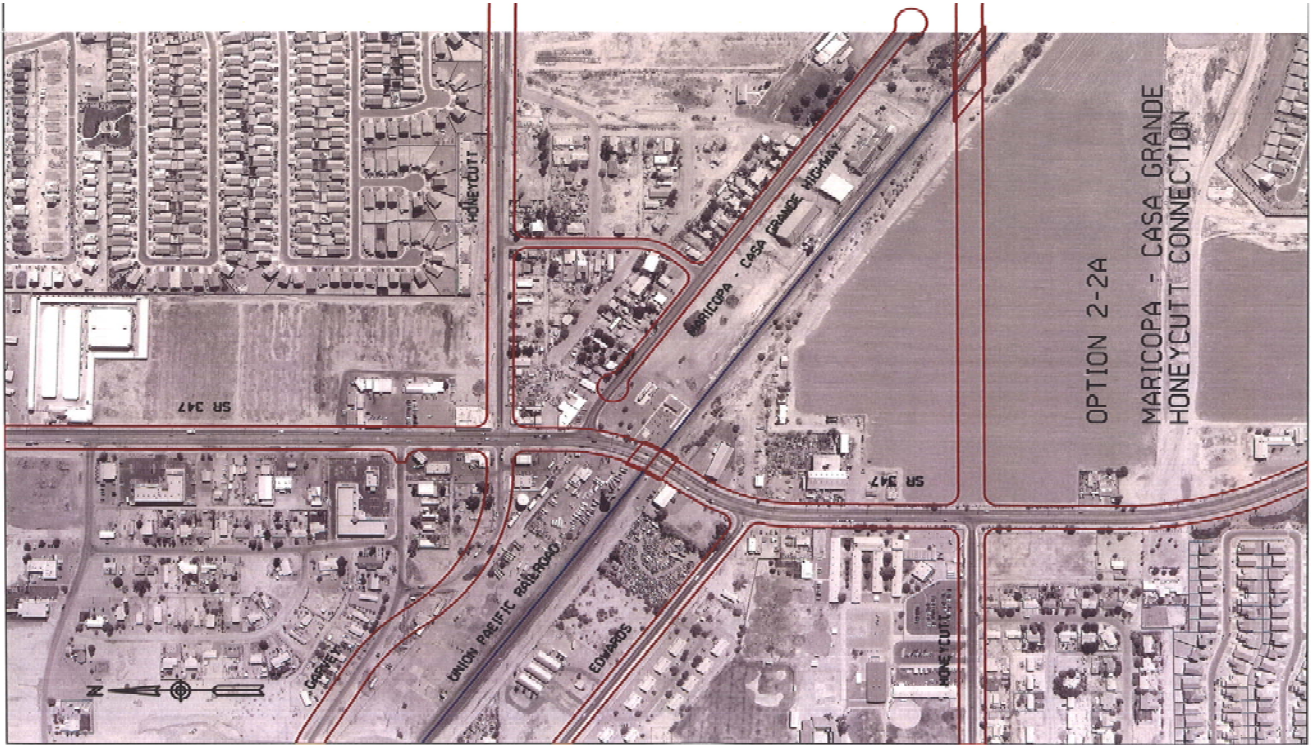
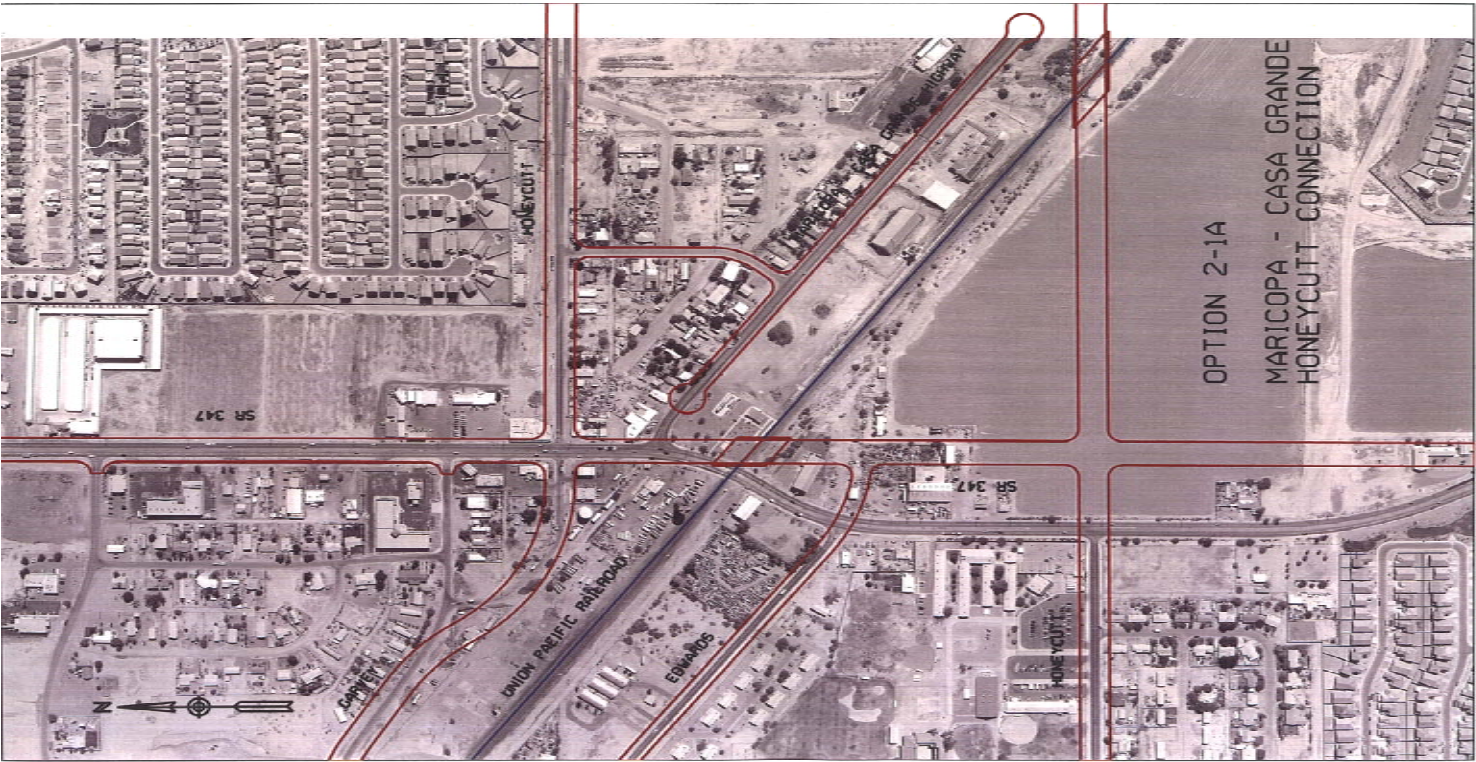
APPENDIX D

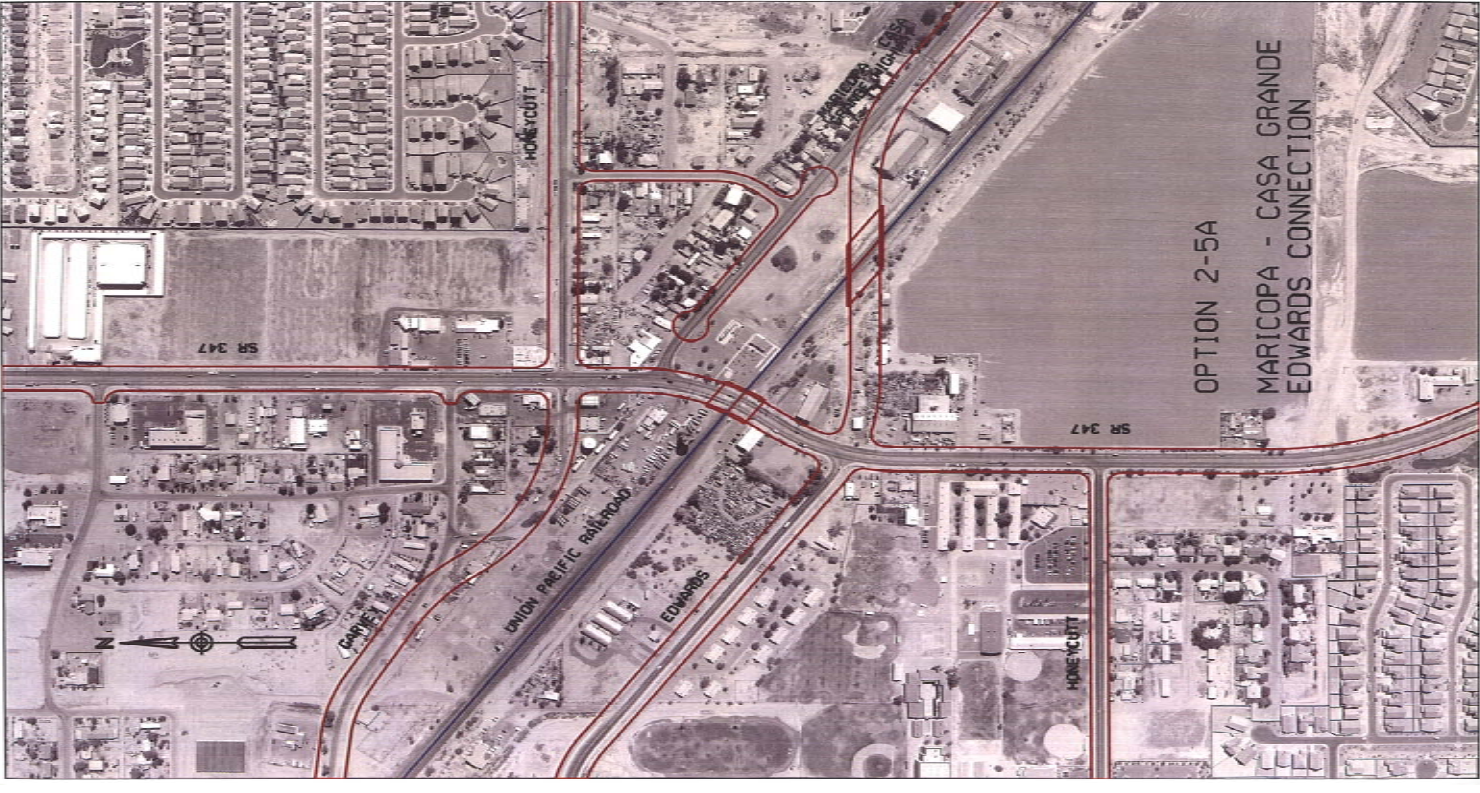
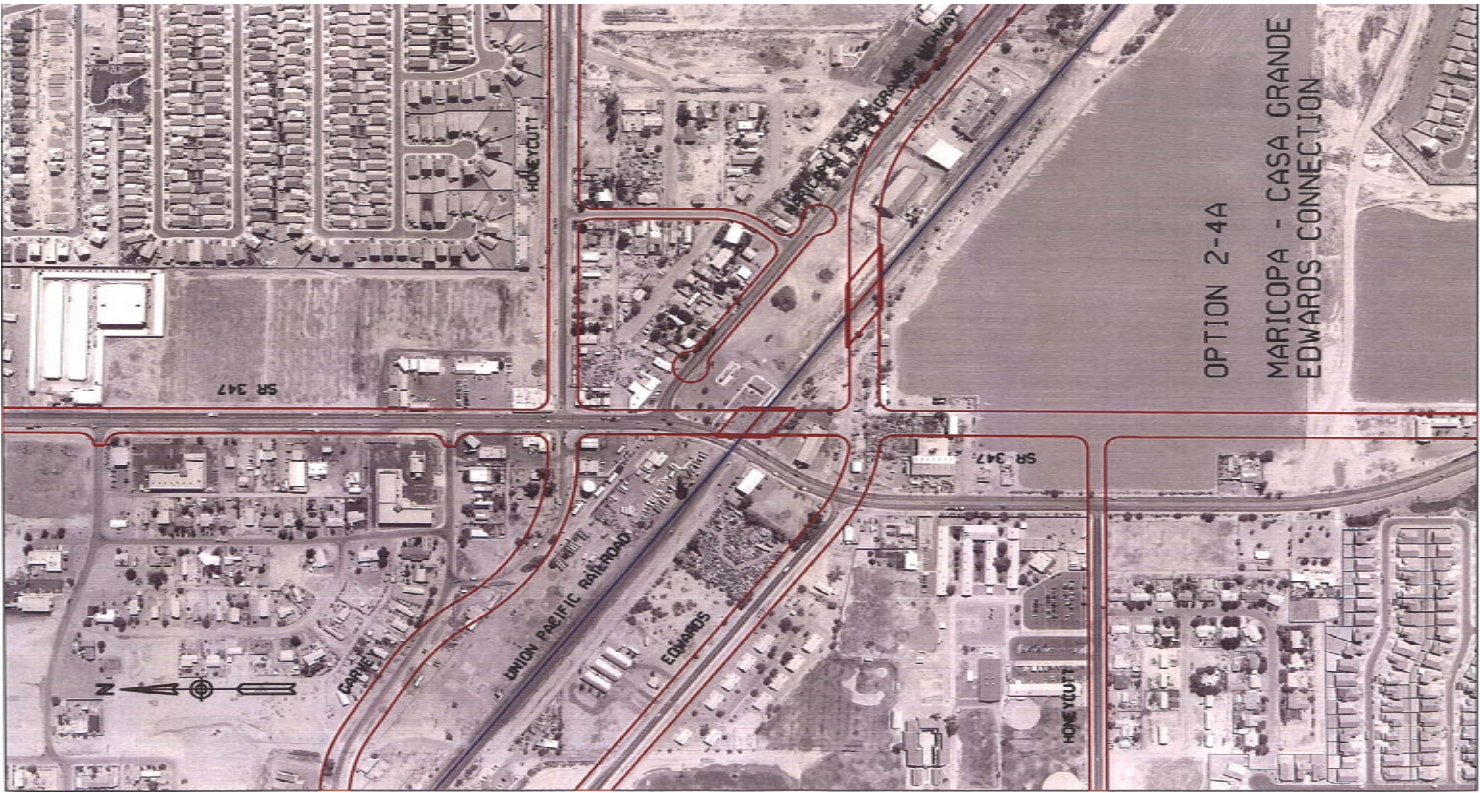
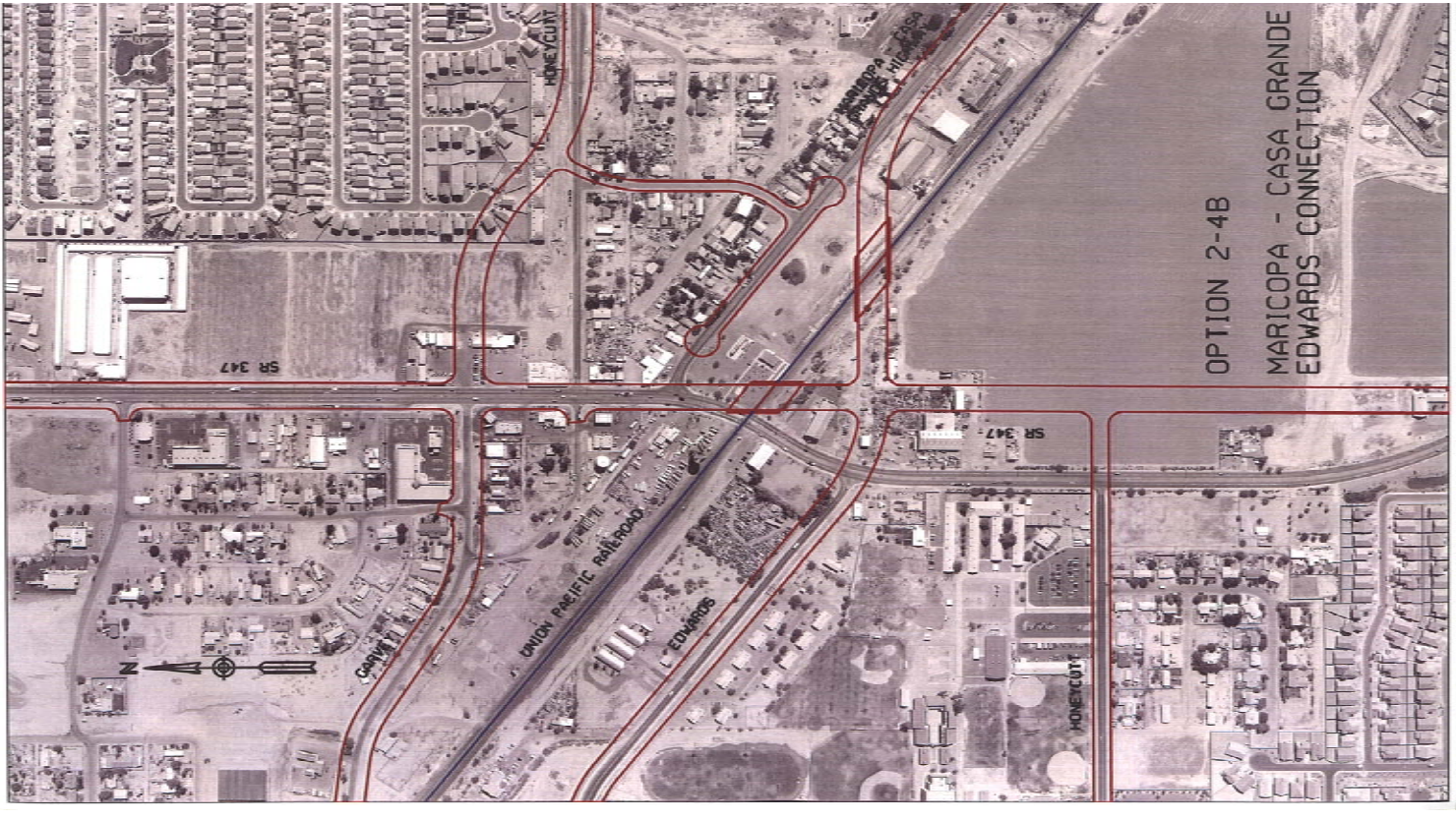
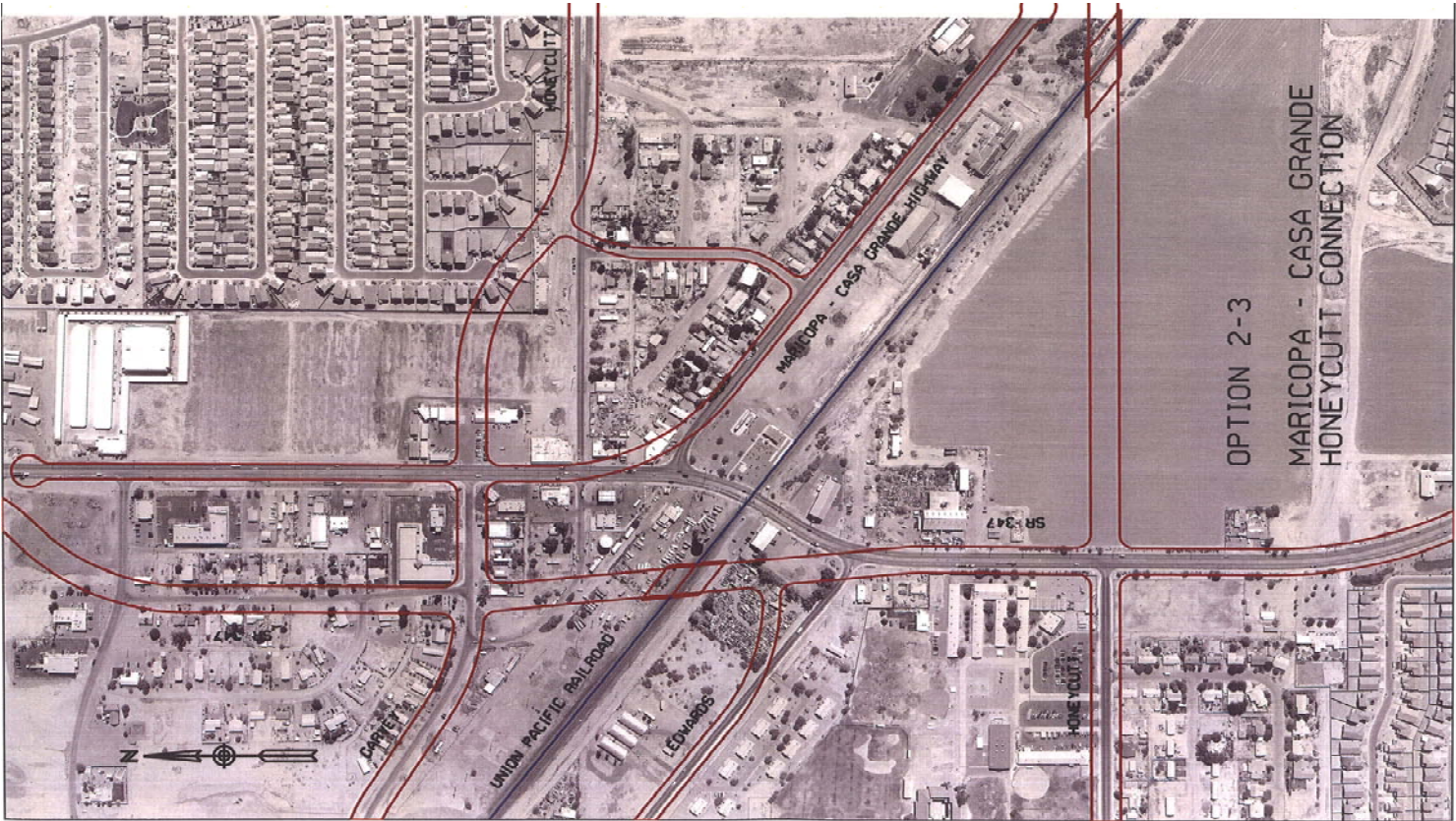
Other AlternativesPage 1 - 8



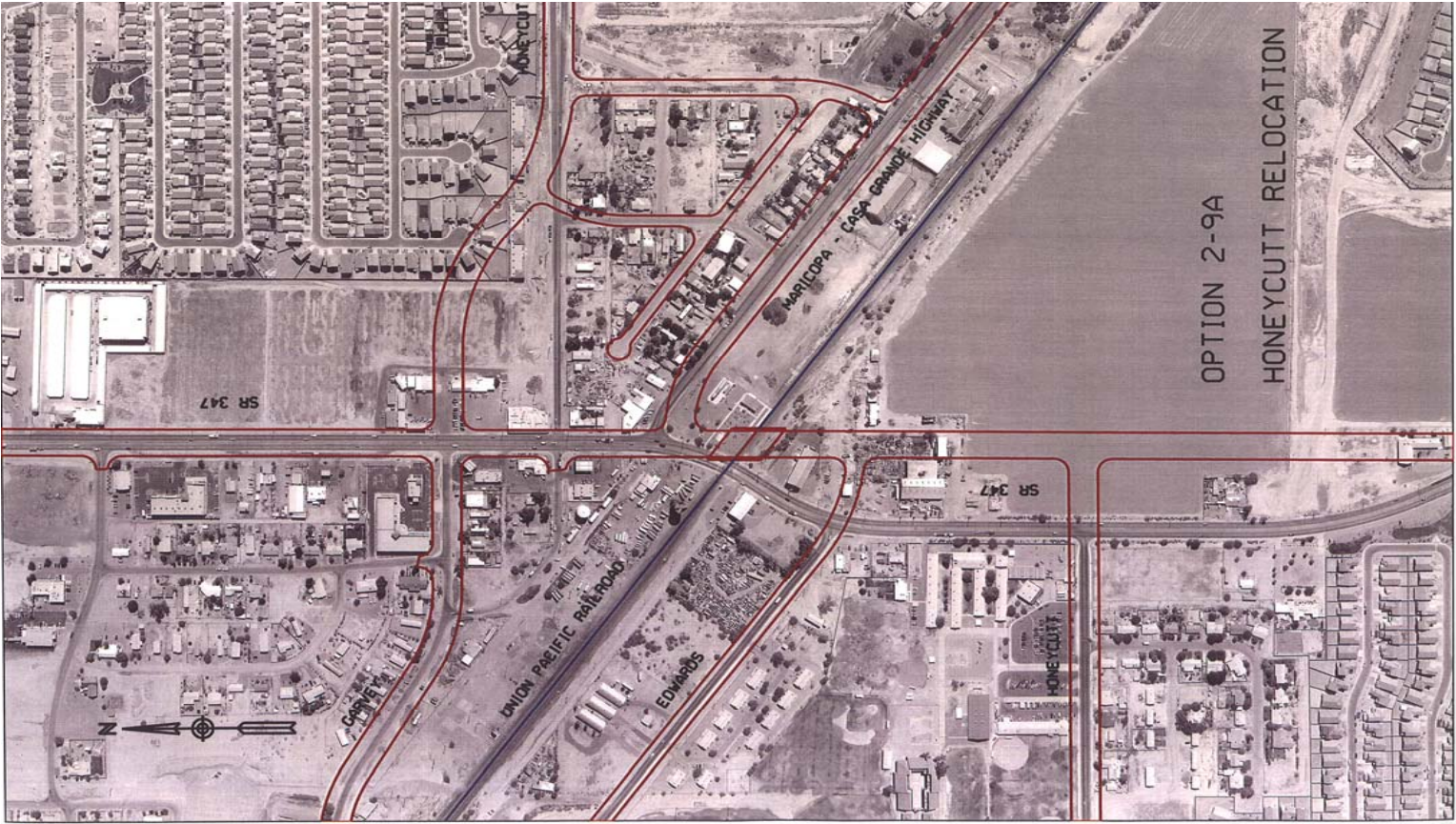
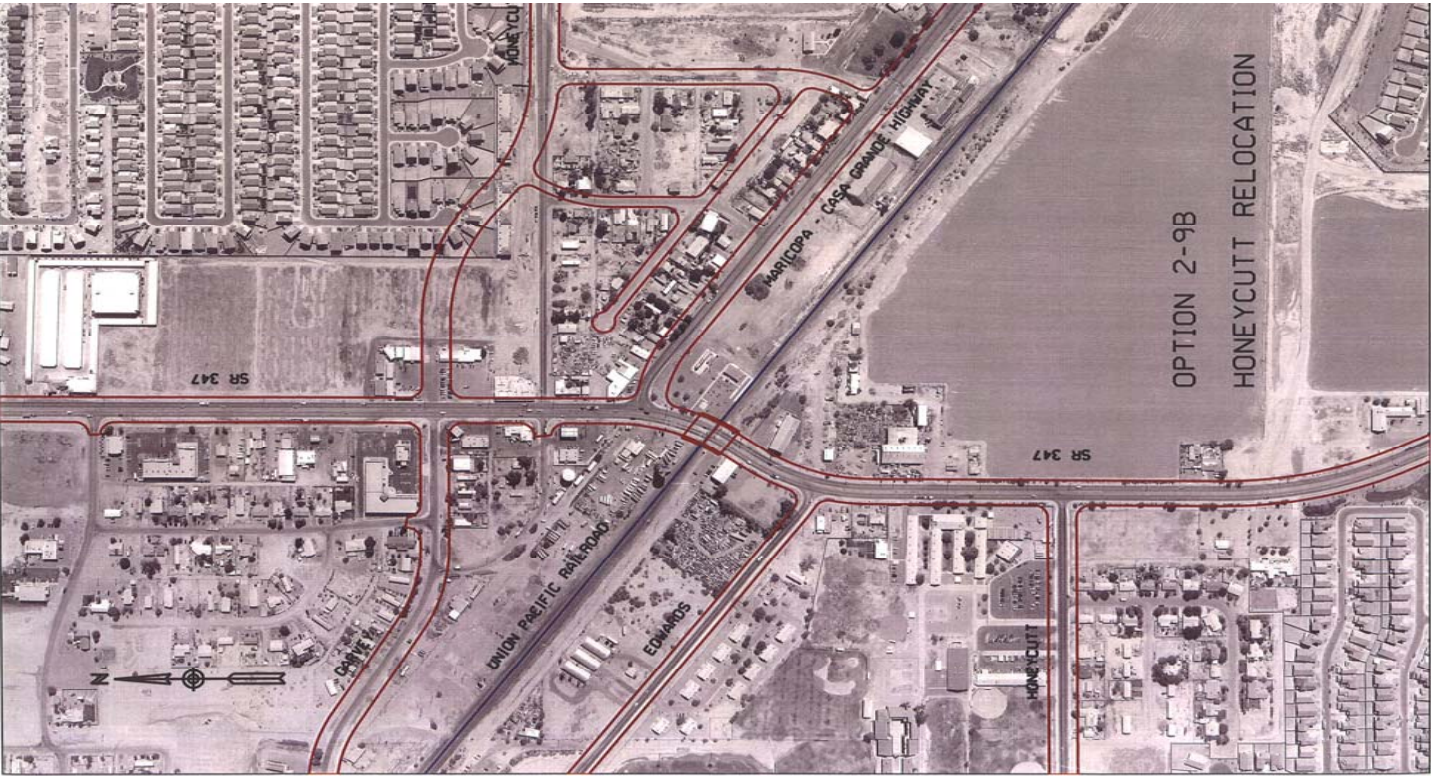
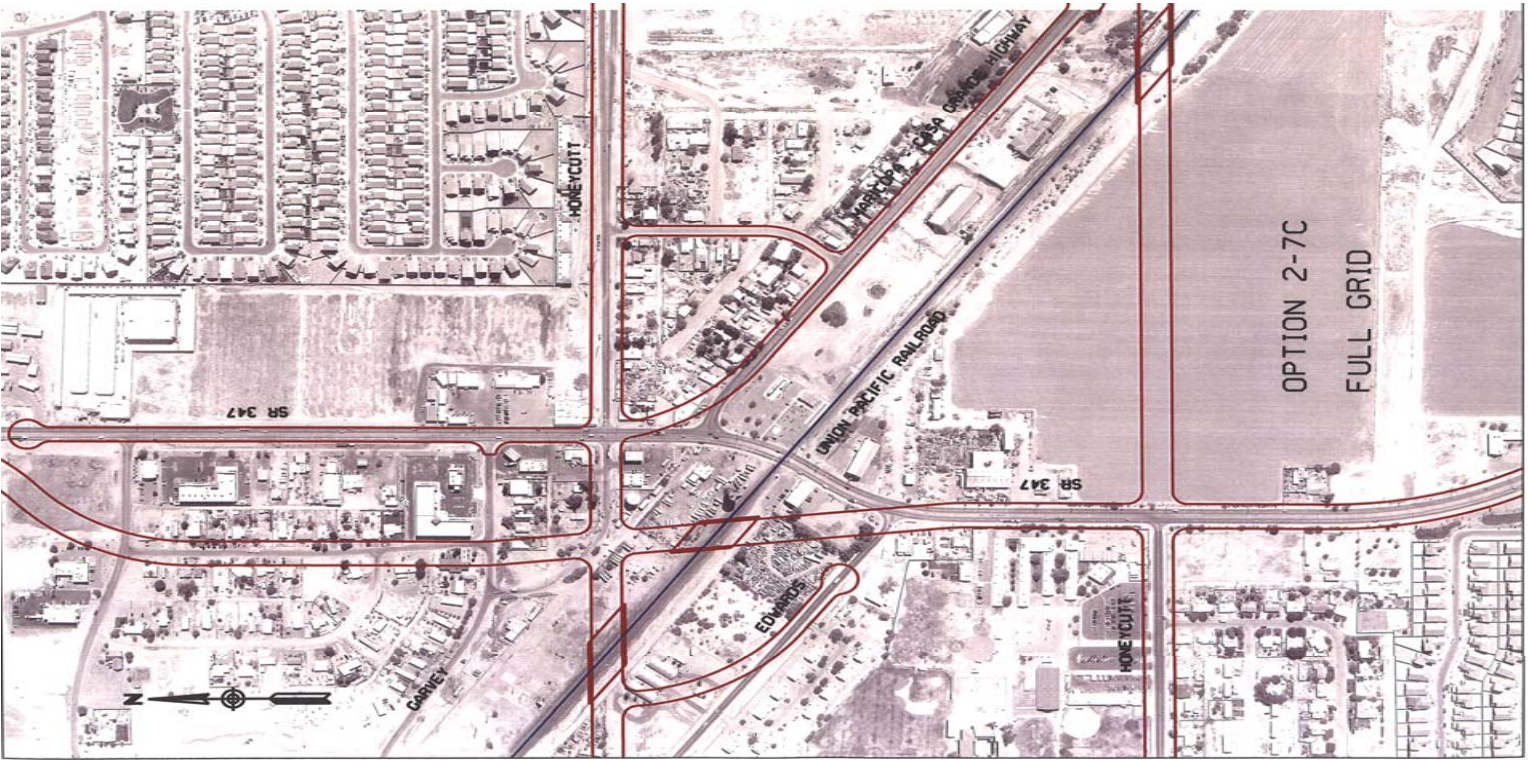












APPENDIX E

Geotechnical and Tunneling MemorandaPage 1 - 3

SR 347 Grade Separation Geotechnical Conditions January 20-07

Geotechnical Profile

The geotechnical profile at the grade separation site is comprised of sedimentary soil deposits within a broad alluvial plain. Based on available boring data, site soil units consist of stratified mixtures of sand, clay and silt variously described as silty to clayey sands, sandy clays, and sands. The soils appear to become somewhat coarser-grained to the west of the site, with increasing gravel fraction. The site soils are generally low in plasticity or nonplastic, to occasionally medium in plasticity, and are typically uncemented and loose or soft within the upper five feet, to weakly to moderately cemented with calcium carbonate and very firm to hard at depth. Firmness and degree of cementation generally increase with increasing depth, and hard, strongly cemented soils may be encountered as shallow as ten or 15 feet below ground surface.

Measured standard penetration test (SPT) blow counts (N-values) ranged from about 5 to 10 in the upper soft or loose soils (depth of five feet or less), to 20 to 30 at a depth of 10 ft, to refusal values (greater than 50 blows/foot) below a depth of about 10 to 15 feet. A somewhat softer (moderately firm to firm) stratum consisting of clayey to silty sand was encountered in areas of the site at a depth of about 25 to 30 feet below existing grades. Cobbles and occasional small boulders are not anticipated to be encountered at the site, except in confined washes and drainages.

Groundwater & Soil Moisture Conditions

The site soils generally are described as slightly moist to moist, with measured soil moisture contents typically in the range of about 1 to 10 percent (dry weight basis), with occasional higher values for more clayey soils. In situ soil moisture contents are anticipated to be relatively low to moderate for the entire site area, with the exception of near-surface soils subject to localized ponding of surface water or effects of previous cultivation/irrigation or landscape watering.

No free groundwater was encountered in borings reviewed for this study, to a depth of investigation of about 30 feet. The depth to groundwater in the site area, based on Arizona Department of Water Resources (ADWR, 2005) published well data for November 1998 and December 2003, is estimated to be in the range of 90 to 120 feet below the existing ground surface.

Moisture-Sensitive Soils

Zones of near-surface soils in the site region possess potential for collapse upon wetting. These low-density soils may extend as deep as about 15 feet, and include formerly cultivated and irrigated soils. Degree of collapse (compression) upon wetting for these soils may be as great as five to 10 percent, depending on specific soil characteristics and applied load. Delineation of the depth, extent and characteristics, and required treatment of potentially collapsible soils will be necessary during design.

Earth Fissures

In response to long-term groundwater pumping and withdrawal, earth fissures and potential earth fissures have been identified in the Maricopa area since the late 1980s. Earth fissures are tension cracks which form in alluvium-filled basins in response to groundwater withdrawal and associated ground subsidence. The fissures occur primarily at the basin edges and in areas where there are significant changes in basin alluvium thickness (such as above buried bedrock ridges or hills). Published investigations by the Arizona Geological Survey (AZGS; Harris, 1995) indicate possible earth fissures about five to six miles west of the project site, north and south of SR 238 at and east of Hidden Valley Road. Earth fissures were not identified in immediate proximity to the site by AZGS. However, investigation of the presence of any earth fissures at the project site and design of mitigation should be completed during design.

Roadway Subgrade Conditions

Depending on the depth, extent, and characteristics of near-surface zones of loose or soft, potentially collapsible soils, pre-wetting and compaction, over excavation and replacement, or alternative treatment may be required beneath proposed roadways and embankments, in order to provide adequate subgrade and reduce potential settlements. Embankment fills should be founded on recompacted near-surface soils or on firm to hard, weakly to moderately cemented soils at relatively shallow depth. A preliminary estimated earthwork factor of 15 percent shrink should be utilized for project excavation and backfill. Site soils are anticipated to be excavatable with conventional equipment, with the exception of isolated zones of caliche at depth which may require heavy ripping. Available borrow from project excavations in the site area is anticipated to consist of mixtures of sand, clay and silt comprised of silty to clayey sands, sandy clays, and sands. These soils will be suitable for use as embankment fill, but will be unsuitable for use as structure backfill.

Foundation Conditions

The firm to hard, weakly to moderately cemented soils at relatively shallow to moderate depths at the site will provide good support for both deep foundations (drilled shafts) and spread footings which penetrate or bear on these soils, with anticipated minimal settlement and differential settlement. For the elevated SR 347 alternative, it is recommended that bridge structure loads be supported on deep foundations (drilled shafts) which penetrate the cemented soils. Drilled shaft excavations will encounter localized caving and/or sloughing of the loose near-surface soils and of isolated sand and gravel strata located at depth. Use of surface casing and possibly slurry-assisted procedures may be required to maintain shaft excavations.

Alternatively, spread footings founded at shallow to moderate depths (at least five to 10 feet below existing grades) on the cemented soils could be utilized for support of bridge substructures and retaining walls. For elevated approaches, conventional cast-in-place or MSE-type retaining walls should be supported on spread footings which bear on weakly cemented soils at a depth of about five feet or greater below grade. Shallow spread footings should be precluded from bearing in the loose or soft near-surface soils due to the potential for excessive compression and settlement of these soils, particularly in response to moisture infiltration. For partially- to fully-depressed crossing alternatives, drilled shafts or spread footings which penetrate or bear in weakly to moderately cemented soils below the depressed roadway grade are recommended for support of the railroad bridge structure and retaining walls. Excessive settlement of structures which bear on the more cemented soils is not anticipated.

Below-Grade Walls & Temporary Shoring

Below-grade walls for the depressed roadway mainline freeway can be constructed by various means, including soil nail, soldier pile and tieback, or conventional cast-in-place walls on spread footings or possibly drilled shafts. Use of a “top-down” construction method will eliminate the need for excavation and backfill behind the walls, particularly in space-restricted areas. Based on available data, subsurface soil conditions at the site generally appear to be well-suited for top-down wall construction, due to the generally cemented nature of these soils, excepting the uppermost soft, loose soil stratum. In a similar fashion, temporary shoring for support of the railroad operations during under crossing construction could consist of soil nail or soldier pile and tieback wall systems.

Retention Basins

Retention basin(s) may be required for storage of collected on-site runoff. Because of the relatively fine-grained and generally cemented nature of the site soils, percolation rates are anticipated to be relatively low. Retention basin design should be supported by field percolation testing at planned bottom-of-basin elevation.

References

Arizona Department of Water Resources (ADWR), Ground Water Site Inventory (GWSI) database on CD, available from <http://www.azwater.gov/dwr/>, June 2005 update.

Harris, R.C., A Reconnaissance of Earth Fissures Near Stanfield, Maricopa, and Casa Grande, Western Pinal County, Arizona, Arizona Geological Survey (AZGS) Open-File Report 95-6, June 1995.

SR 347 Grade Separation Project Tunnel Jacking January 2007

Tunneling utilizing the tunnel jacking method could be considered as an alternative to cut-and-cover construction of the SR 347 under crossing of the UPRR tracks. Details of the tunnel jacking method were obtained from the Federal Highway Administration (FHWA) Road Tunnel Guidelines (FHWA, 2004). According to FHWA, the tunnel jacking method, which evolved from pipe jacking, usually is used in soft ground (soils and weak rocks) for short lengths of tunnel under existing railroads and highways. The objective of tunnel jacking is to create large, shallow underground openings beneath facilities which are to be kept in-service during construction, and for sites where cut-and-cover construction is otherwise not desirable. According to the FHWA, the method is not new, though generally it has had limited application in the US. An exception is the Boston, Massachusetts Central Artery/Tunnel project (the “Big Dig”), where tunnel jacking was completed on a massive scale for multi-lane tunnels beneath a system of seven in-service railroad tracks at the I-90/I-93 TI (FHWA, 2004; Powderham, 2004).

The basic tunnel jacking sequence involves constructing the tunnel box on-site (in discrete segments of length as needed by the overall crossing length) on a jacking base in a jacking pit located on one side of the facility to be crossed under. A tunneling shield is at the leading edge of the box, and hydraulic jacks provide thrust to the back of the box by resistance against the back wall of the pit. The box is tunneled into position under the facility

by incrementally excavating ground from within the shield at the leading edge, and jacking the box forward. To maintain tunnel face support, excavating and jacking are performed in an alternating fashion in small increments, typically about 0.5 foot. Considerations in tunnel jacking include determining the required tunnel opening (clearance envelope); required driver sight distance; acceptable degree of disturbance to the overlying facility, including predicting ground movements and then monitoring same; optimum or required depth from ground surface to the top of the tunnel (cover); and ground conditions, including tunnel face stability and adequate resistance for provision of jacking force (FHWA, 2004).

Regarding ground drag during tunnel jacking, anti-drag systems have been developed which effectively separate the external surface of the box from the adjacent ground, isolating the soils from the drag forces. One example system consists of closely-spaced wire ropes, one end of which is anchored at the jacking pit. As the box advances forward, the ropes are drawn out through guides in the shield, form a stationary “separation layer” between the moving box and adjacent soil, and absorb the drag forces which are thereby transferred back to the jacking pit (FHWA, 2004).

Ground loss at the tunnel face is controlled by the shield, by control of the face excavation and box advance, and in certain instances by ground treatment or stabilization (such as by grouting or ground freezing) in advance of the tunneling where ground conditions warrant. Jacked box tunneling operations are carefully monitored and controlled to ensure that alignment, acceptable performance and safety are achieved and maintained, and to verify that ground movements of the overlying facility are within tolerances.

In general, based on available data, soil conditions at the site are considered favorable for tunnel jacking of the UPRR under crossing. The existing, cemented nature of the native site soils will serve to enhance control of the face excavation, reduce ground loss at the tunnel face, and aid in avoiding unacceptable movements of the overlying ground. Ground treatment/stabilization of a limited thickness of near-surface loose soils, such as by grouting, may be necessary if these soils are present at the crossing site. Detailed geotechnical investigation of the site would be required in support of tunnel jacking design, as well as a comprehensive program for instrumenting and monitoring ground movements, including appropriate threshold (alert level) movements.

References

Federal Highway Administration (FHWA), FHWA Road Tunnel Design Guidelines, Report No. FHWA-IF-05-023, Washington, DC, July 2004.

Powderham, A., “Jacked tunnels - open heart surgery on Boston”, in Ingenia, Quarterly Journal of the Royal Academy of Engineering, London, England, Issue 19, May/June 2004.

APPENDIX F

Environmental Overview Appendices Page 1 - 24

Appendix A
Meeting Notes and Sign-In Sheets



Meeting Notes

Subject: Agency Scoping Meeting	
Client: City of Maricopa, Arizona	
Project: SR 347 & UPRR Grade Separation Feasibility Report / Environmental Overview	Project No: TRACS No. H 7007 01L Contract No. 02-012006 HDR 41607-044
Meeting Date: June 7, 2006	Meeting Location: City of Maricopa Public Works Yard 45138 W. Garvey Avenue Maricopa, AZ
Notes by: Chet Teaford and Jessica Hernandez	

Attendees (refer to sign-in sheet, attached):

Meeting Agenda / Notes

- 1) Introductions
- 2) Meeting Intent and Goals
- 3) Overall Lines of Communication/Reviews/Approvals
- 4) Project Background and Update

a. Feasibility Study

b. Environmental Overview
- 5) Key Issues

a. Maricopa Growth

b. UPRR

c. Tie to Maricopa-Casa Grande Highway

d. Local Roads/Access/Circulation

e. Public Safety/Services

f. John Wayne Parkway “Signature Street”

g. Environmental Issues – cultural resources, socioeconomic, hazardous materials

h. Public Involvement

i. Project Schedule
- 6) Agency Issues
 - It typically takes 18-24 months for UPRR to have maintenance agreement with ADOT.
 - Once the UPRR-ADOT maintenance agreement is agreed, it typically takes AZ Corp Comm – 3-4 months for approval.
 - For an agreement with UPRR, the project “footprint” (approximately 30% plans) – and requirements of UPRR will be needed, including construction estimate, and right-of-way (R/W) easement exhibit.
 - For state (ADOT) projects, all submittals to the UPRR need to be through ADOT Utilities and Railroad (U&RR) Section.

- Project team needs to provide project schedule to involved agencies, when available.
- It will be important to maintain traffic along and access to the Maricopa-Casa Grande (M-CG) Highway throughout construction.
- There are no good, convenient alternatives available for detouring north-south traffic from SR 347.
- Need to consider access throughout for the fire department, as they already have difficulties in getting in and out of their station and onto SR 347. Fire Station #1 may have to be relocated.
- New fire station (Alterra) will be operating south of UPRR, and the fire department needs to support both fire stations.
- Project will need to provide a shoofly (temporary detour or reroute) for any disruption of UPRR operations, or relocation of their tracks.
- City of Maricopa Police Department and Pinal County Sheriff’s Office need to maintain reasonable response times, especially during construction with the detours. Detours typically increase response times, and may result in more congestion and accidents.
- Consultant should conduct a traffic analysis to determine if having one lane open in each direction will be feasible – and adequate – during construction.
- Consultant should look into a possible 3-lane detour with a reversible center lane.
- Some residents located south and east of the City Hall area may not be in favor of nighttime construction.
- Ak-Chin and the City of Maricopa are planning a new commercial development center along SR 347 south of UPRR.
- Ak-Chin (government operations and the casino) employs over 1000 people, with roughly 80% being from the Phoenix Area.
- Over 3 million people visit the casino annually. Most of these people also come from the north, along SR 347.
- There is significant other development along SR 347 south of the Ak-Chin IC, including the Stanfield area. Most of those residents work in the Phoenix area.
- The grade separation needs to be at least 6-lanes and perhaps expandable to 8-lanes.
- Consultant should look into elevating the UPRR over SR 347. This will have fewer utility impacts, less local road impact, and may reduce noise from the UPRR. It was mentioned that the maximum grade for the railroad would be 1% and the tracks are at 0.8% grade currently.
- If UPRR is not elevated over SR 347, consider “splitting the difference”, i.e. raising the UPRR some, and lowering SR 347 some.
- A question was raised as to the width of the existing UPRR R/W. The UPRR R/W is 150 feet in width.
- All reasonable options need to be discussed in the Feasibility Report, with explanations on why some were not pursued further. New alignments or new roadways east and west of the current alignment should be considered.
- If SR 347 mainlines are relocated away from the existing SR 347 alignment, it might be possible to retain the existing at-grade crossing as a local street, for local traffic only.
- AMTRAK needs to maintain access to their existing station, or possibly relocate the station. A question was raised if AMTRAK was studying relocating the station to Phoenix. AMTRAK is not studying this issue, but UPRR may be.
- AMTRAK is also very open to relocating platform to the southeast, within reasonable walking distance of the station.
- The project needs to investigate / assess the local / historic characteristics of the proposed “Old Town Redevelopment” area.

- Project also needs to be aware of “4(f)” properties, e.g. the School.
- Project also needs to consider impacts to and possible relocation of businesses and residences in the area, as part of the environmental overview process.
- Project also needs to consider noise receptors in the area, and possible mitigations.
- The Maricopa City Council is concerned about the visual impact of going over the tracks.
- ED3 has a 69kv line at Honeycutt Road.
- If the UPRR is elevated over SR 347, it might reduce noise from the UPRR.
- Elevating the UPRR would allow traffic circulation below the railroad.
- If the at-grade crossing is eliminated, then there will be fewer train whistles (noise) in the community. But AMTRAK will still need to blow whistle when stopping/starting.
- Project / City may want to consider relocating all emergency services (police, fire, ambulance) to one location with a signal and pre-emption.
- The SR 347 project will need to be closely coordinated with the M-CG project to maintain routes for emergency services.
- City may consider expediting construction of other grade separations (east of SR 347, along the Maricopa-Casa Grande Highway) so that these may be used as a detour route while the SR 347 grade separation gets constructed.
- The City of Maricopa reemphasized the importance of this project to the community.
- Project team needs to make sure that obtaining permits, e.g. for geotech drilling and surveys, are considered in the project schedule.
- Project team needs to keep FHWA informed on the environmental process to make sure that project qualifications are met for federal money.

7) Action Items

- Provide FHWA 11X17” maps of the project area.
- Distribute sign-in sheets to all participants (some pages were missing from handouts).

8) Upcoming Meetings

- **Public Information meeting** Wednesday, June 28th
 - To be arranged with ADOT CCP, by the City and HDR.
- **Concepts Workshop** Friday, July 14th
 - We need to have critical information gathered prior to this meeting – traffic, public input, UPRR requirements, and environmental issues.
 - We need to hold this date if at all possible, due to vacations planned for late July.

Attachments

- 1) Sign-in sheets

SIGN-IN SHEET

SR 347 & UPRR Grade Separation Feasibility Report / Environmental Overview
TRACS No. H 7007 01L
Contract No. 02-012006
HDR 41607-044

Agency Scoping Meeting
Wednesday, June 7, 2006, 9:00 AM

PRINTED NAME	REPRESENTING	PHONE	E-MAIL
Mike Deller	ADOT, UPRR	(602) 712-8648	mdeller@azdot.gov
Mike Corbin	AZ DPS	520 836 1057	M(CORBIN@AZDPS.GOV
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Tyler Wilkerson	" "	602-712-6962	twilker@azdot.gov
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Leslie Burnett	AK-Chin Indian Comm.	520-568-1074	lburnett@ak-chin-nsn.us
Chet Teaton	HDR	602.522.7746	cteaton@hdrinc.com

SIGN-IN SHEET

SR 347 & UPRR Grade Separation Feasibility Report / Environmental Overview
TRACS No. H 7007 01L
Contract No. 02-012006
HDR 41607-044

Agency Scoping Meeting
Wednesday, June 7, 2006, 9:00 AM

PRINTED NAME	REPRESENTING	PHONE	E-MAIL
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SIGN-IN SHEET

SR 347 & UPRR Grade Separation Feasibility Report / Environmental Overview
TRACS No. H 7007 01L
Contract No. 02-012006
HDR 41607-044

Agency Scoping Meeting
Wednesday, June 7, 2006, 9:00 AM

PRINTED NAME	REPRESENTING	PHONE	E-MAIL
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LEV DERZHAVETS	ADOT Rwy Design Sec.	602-712-6733	lderzhavets@azdot.gov
GARY MAUCK	AMTRAK	980 565 4946	MAUCK1273@AMTRAK
Jessica Hernandez	HDR	602-474-3970	jessica.hernandez@hdrinc.com

SIGN-IN SHEET

SR 347 & UPRR Grade Separation Feasibility Report / Environmental Overview
TRACS No. H 7007 01L
Contract No. 02-012006
HDR 41607-044

Agency Scoping Meeting
Wednesday, June 7, 2006, 9:00 AM

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STEVE THOMAS	FHWA	" X117	Steve.Thomas@fhwa.dot.gov
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TROY SIEGLITZ	PBS&J	602-943-1003	tsieglitz@pbsj.com



October 25, 2006

**CITY OF MARICOPA
TRANSPORTATION IMPROVEMENTS
PUBLIC MEETING**

Date & Time:	Location:
Wednesday, October 25, 2006 6:30PM – 8:30PM	Maricopa High School, Main High School Gym, 45012 W. Honeycutt Avenue Maricopa, AZ 85239

Please sign in – Please print

Name:	JANE HENIG
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October 25, 2006

Please sign in – Please print

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October 25, 2006

Please sign in – Please print

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October 25, 2006

Please sign in – Please print

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City, State, Zip:		
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June 28, 2006



CITY OF MARICOPA
TRANSPORTATION IMPROVEMENTS
PUBLIC MEETING

Date & Time: Wednesday, June 28 th , 2006 6:00PM – 8:00PM	Location: Maricopa High School, Main High School Gym, 45012 W. Honeycutt Avenue Maricopa, AZ 85239
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Please sign in – Please print

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City of Maricopa

1

June 28, 2006

Please sign in – Please print

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City of Maricopa

3

June 28, 2006

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City of Maricopa

6

June 28, 2006

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City of Maricopa

17

June 28, 2006

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SR 347 Grade Separation
Project #41607
Contact List May 2006

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Meeting Notes

Subject:

Client:

Project:Project No:

Meeting Date:Meeting Location:

Notes by:

Attendees:

Ak-Chin Indian Community members
Chet Teaford, HDR Engineering, Inc.
Troy Sieglitz, PBS&J
René Tanner, HDR Engineering, Inc.

Topics Discussed: Grade separation of SR 347 and railroad tracks, double tracking of the railroad, funding, right-of-way, safety, access, timeframe, toll roads, emergency services, and improvements to the Maricopa-Casa Grande Highway.

Notes:

Chet Teaford introduced the SR 347 project and explained that improvements were being studied for the SR 347 and the Union Pacific railroad crossing and the Maricopa-Casa Grande Highway.

Question: Does the railroad have the right-of-way necessary for double tracking? In the past, the Ak-Chin had to give right-of-way to the railroad.

Answer: The railroad is a transcontinental connector. The railroad has asked that the study plan to overpass or underpass a third line of railroad track. We know what the railroad has in terms of right-of-way. The study team will need to learn who owns the other parcels. There is explosive growth in the City of Maricopa specifically and Pinal County in general. There are several previous studies that this study will use to gain information. To determine the needs for the Maricopa-Casa Grande Highway, PBS&J has three previous studies from which to gain information. PBS&J is already aware that there is inadequate drainage for the Maricopa-Casa Grande Highway. Currently, the highway goes through the Santa Cruz Wash. A bridge crossing is needed; however funding sources for this work have not been identified.

Both studies will research opportunities for funding partnerships. Results for both studies will be available in six to seven months. Once this phase is complete, additional environmental study and preliminary design can begin. Final design can be done once the environmental work is complete. Construction will not occur until there is funding in place.

Contact information was given for Brent Billingsley, Karen Wonders, Troy Sieglitz, and Chet Teaford. The City plans to provide answers to general comments through the City of Maricopa Web site.

Troy introduced the Maricopa-Casa Grande Highway project, stating that the team will be looking at improvements to the highway from the City of Maricopa (SR 347) to Val Vista.

Question: Will they be double tracking there too?

Answer: Yes. The railroad runs parallel with the Maricopa-Casa Grande Highway.

Question: Where is Maricopa going to build their new City Hall? Will it be modular?

Answer: We’re not sure, but our understanding is that it will be a permanent City Hall Complex.

Question: What part of this project is funded?

Answer: Only the two studies for now.

Comment: We appreciate the City staff including the Ak-Chin Community in the planning of this study.

Question: Will the right-of-way information be provided to the Ak-Chin? Will we have an opportunity to review the studies?

Answer: The right-of-way information will be in the report and it will be available for comment.

Comment: We are concerned about safety at the railroad crossing during construction. Access needs to be maintained. We would like the opportunity to review and approve the traffic control plan. We are concerned about the impact construction will have on the Ak-Chin Casino. People use SR 347 to reach the Casino.

Response: There are no good detours around the SR 347/railroad crossing. Access will need to be maintained along SR 347 during construction. This may mean that the new crossing would be built alongside the existing crossing.

Comment: Emergency services personnel are impeded by the Amtrak train and the railroad.

Response: This concern was brought up at the agency scoping meeting as well. The team has talked to Amtrak about moving the platform some.

Question: Is the Union Pacific railroad part of the project team?

Answer: We are coordinating with the railroad.

Question: What is the timeframe for construction?

Answer: Due to funding issues, the construction is five to six years out. Maricopa has some funding, but they need more and the City has many needs.

Question: What about a toll road constructed by the builders? They are ruining the roads with all the development. A toll road would solve some problems. The City would need to talk to the Gila River Indian Community. The Gila River Indian Community does not want it, but the mayor does. The City of Casa Grande wants to build a road to connect I-8 and I-10. What about developer funded crossings?

Answer: The City passed an impact fee that will help with transportation needs and emergency services. The challenge for the County is that the capacity of existing facilities has been exceeded.. Developers are looking at constructing their own connector south of the Maricopa-Casa Grande Highway. Developers are possible partners for future projects.

Question: What would you like the community to consider?

Answer: We would like to know your opinions and concerns. For example, do you have an opinion about whether the crossing should go over or under the railroad tracks? Do you know of dips or curves that are unsafe, or places where there are a lot of near misses?

Question: What is better, an overpass or an underpass?

Answer: Generally, an overpass would cost less than underpass; however the overpass would have a greater visual presence.

Question: What happens to the intersection of SR 347 and the Maricopa-Casa Grande Highway if it goes over? Will that intersection need to be reconfigured?

Answer: Yes. It would need to be reconfigured.

Question: When the studies are done, will accidents be considered?

Answer: Yes. The emergency services personnel are involved in the study and safety will be incorporated; however, congestion and growth are the primary factors driving the study.

Question: Has the City of Maricopa talked about widening SR 347 near the Shell station?

Answer: The City plans to widen SR 347 to three lanes in each direction between the Ak-Chin and Gila River Indian Community lands.

There were no more questions. People were encouraged to give the team any completed comment forms. They were invited to mail any additional comments.

KEY:

Those comments highlighted in yellow are from the comment forms
Non-highlighted items are from comment cards - either completed by staff or attendees - or mentioned during the QA session after the presentation
Items in red were illegible, best guess made

Comment
Form / Card

Number	Comment
1	Potential EPA Site = Federal dollars for park? Renewable energy station.
3	Porter Road Bypass North and South of community.
4	Worry about getting to I-10.
4	Add toll road thru GRK possible funding.
4	Look a transit (rail) connection to LRT in Phoenix.
4	Look at truck bypass - safer.
5	More trucks are passing thru town.
5	Do this planning right and industry and business will come to Maricopa.
5	City of Phoenix may want to invest in Maricopa to keep Maricopa residents spending in Phoenix.
6	Don't we expect Maricopa will be more than a bedroom community? Don't we expect industrial uses in the MAG corridor?
6	Is it advantageous to Phoenix to improve roads in Maricopa to ease congestion in Phoenix?
8	Washes on Val Vista washes. Get rid of low crossing.
8	With growth AZ Republic will probably come thru town.
8	What will happen to properties?
8	Amtrak site station.
9	Possible "loop" freeway with Phoenix.
10	Most cities have beltways, same thing could be done here.
10	Need to look at access from other communities.
11	What are the development plans? What other bypass routes are being considered?
13	Need to work with Indian Communities on additional east / west and north / south connections.
14	What other high priorities are planned?
18	Substation - Sundunn Electrical District 3 - concerned about what will happen to substations with improvements to Maricopa Casa Grande Highway.
20	Interested in electronic copy of meeting materials.
23	Concern over rate of growth and impacts on existing regional facilities.
24	When will it be done?
25	Hazardous site? Clean up - use federal money.
26	Meeting was very informative and consultants and ADOT helpful.
27	Provide more alternate routes to / from Maricopa.
28	Incorporate local focus.
29	Website for project.
31	Maricopa has potential to be a stand alone industrial community.

32	Fast food on corners / on highway.
33	4 lanes at least.
34	Add lighting (preferable) and / or reflectors.
36	Other funding than Maricopa County maybe Pinal County, Phoenix - we are dependent etc. on each other.
37	Provide art treatment on walls. Focus on community water tower, business.
41	Pavement on slow lanes on road in / out of town is cracked and uneven.
42	City must address transportation to address growth.
43	Is anything being planned / looked at for rail into Phoenix?
44	Access to I-10 a concern.
45	Concern: Additional east / west roadway connecting Maricopa and I-10.
46	Beltway at business area. Maintain exist crossing?
48	Don't hamper Amtrak use.
51	Educate about other routes.
53	Too fast speed, not wide enough, no patrolling, unsafe.
54	Develop a loop around Maricopa to travel around. Then I describe as travel road, I mean five lane traffic road moving speed of 45 miles per hour and straight through roads. This would move traffic.
54	Maricopa needs to work on moving the Amtrak station away from 347.
54	Speed through Maricopa (Honeycutt Ave to Hathway Ave) should reduce to 25 miles per hour.
54	Place a 30 second traffic light at Garvey Ave. and Hwy 347 and Honeycutt Ave. and Hwy 347
QA Session	Any improvement around the UPRR will affect the Amtrak station, what are you going to do about that?
QA Session	UPRR likes to use steel structures - we don't want an industrial look.
QA Session	Where is the traffic going to go when the project's under construction?
QA Session	As construction continues in Maricopa are "truck only" lanes going to be considered?
QA Session	Have you considered working with Gila River Indian Casino to construct a toll road?
QA Session	Can we accelerate these projects? When you consider our growth we are going to be in real trouble.
QA Session	USCOE and other federal processes take time and could cause more delay.
QA Session	Have you considered building a beltway around the City?
QA Session	What is the building community doing to help with the transportation problem?



**SR 347 – Union Pacific Railroad
Proposed Grade Separation
Alternatives
Public Meeting**



Date: October 25, 2006
Time: 6:30 to 8:30 p.m. (presentation at 7 p.m.)
Location: Maricopa High School, Multi-purpose Room
45012 W. Honeycutt Avenue, Maricopa
Attendees: Approximately 25 members of the public
(sign-in sheets are attached)

Agency Representatives:
Karen Wonders, City of Maricopa
Brent Billingsley, City of Maricopa
Tim Wilson, Arizona Department of Transportation
Jay Morrison, Arizona Department of Transportation
Others:
Chester Teafor and staff, HDR
Scott Stapp, HDR
John Godec and staff, Godec, Randall & Associates
Debra Duerr, URS Corporation

Advertisement copy

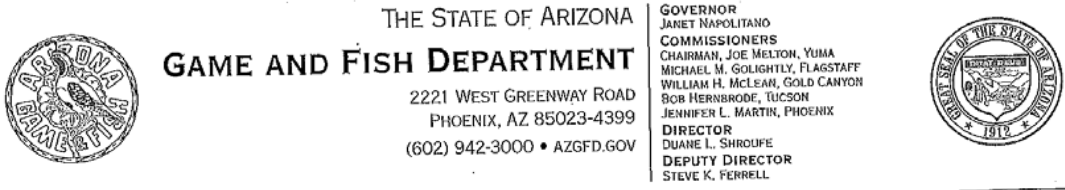
The City of Maricopa has been working over the past few months to develop possible alternatives for a grade separation – either an overpass or underpass – of John Wayne Parkway (State Route 347) and the Union Pacific Railroad tracks to help relieve traffic congestion in the downtown area. Concepts include several alternatives that could impact local residents, businesses, the traveling public, and community development.

Please join us at this public meeting to participate in the study process and assist the City and State in the evaluation of the various alternatives. Your ideas, thoughts and concerns are critical for the success of this future project.

Presentation

Chet Teafor, HDR, provided an overview of the project including project goals, issues and challenges. The presentation compared current traffic counts to projections for 2030, which on average showed five times the traffic at each location in 2030. He reviewed five options under consideration for the roadway and explained that these options are preliminary and subject to change. Attendees were invited to provide input regarding benefits and problems with the options, and to suggest other options.

Appendix B
Agency Correspondence Received



July 14, 2006

Ms. Rene Tanner
HDR Engineering Inc.
5210 East Williams Circle, Suite 530
Tucson, AZ 85711

Re: SR 347 & UPRR Grade Separation Feasibility
ADOT TRACS No.: H7007 01D

Dear Ms. Tanner:

The Arizona Game and Fish Department (Department) has reviewed the letter dated June 30, 2006, regarding the Arizona Department of Transportation's (ADOT) and the City of Maricopa's feasibility study and environmental overview to determine the improvements necessary to increase mobility along State Route 347 (SR) and the consideration of a grade-separated crossing at SR 347 and the Union Pacific Railroad Tracks, in Pinal County, Arizona. The legal location of this project is Township 4 South, Range 3 East, sections 21, 22, 27, 28. The Department understands the proposed project for a grade separation crossing would include an overpass or an underpass of the railroad. Improvements are also being considered because either grade separation option may necessitate realignment of a portion of the Maricopa-Casa Grande Highway. Per your request, the Department's Heritage Data Management System (HDMS) has been accessed and current records show that the special status species listed on the attachment have been documented as occurring in the project vicinity (3-mile buffer). This project does not occur within Proposed or Designated Critical Habitat. We have also included Western burrowing owl information for your consideration. The Department provides the following comments.

The Department's HDMS data are not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity.

The Department has undertaken a joint effort with the Arizona Department of Transportation (ADOT), the Federal Highway Administration (FHWA) and the U.S. Forest Service (USFS), along with representatives from other agencies and non-profit groups to identify wildlife linkages across the state that need to be maintained to ensure wildlife permeability. The Department is interested in maintaining wildlife connectivity in this region and in the broader context of future development and in relation to the roadway itself. Please contact Ray Schweinsburg, Research

RECEIVED

1 JUL 20 2006

HDR ENGINEERING



AN EQUAL OPPORTUNITY REASONABLE ACCOMMODATIONS AGENCY

Ms. Rene Tanner
July 14, 2006

2
Arizona Game and Fish Department at (602) 789-3251, for further information pertaining to current research, and the Department's interest in maintaining wildlife connectivity and permeability and specific design recommendations (culverts, etc.).

The Department appreciates the opportunity to provide preliminary comments on this project. In addition, the Department would like to continue this coordinated effort along with the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with project development when more information becomes available. If you have any questions regarding this letter, please contact me at (602) 789-3486.

Sincerely,

Alicia Sweezer
Project Evaluation Specialist

Attachments

cc: Russ Haughey, Habitat Program Manager, Region VI, AGFD
Russ Engel, Habitat Program Manager, Region IV, AGFD

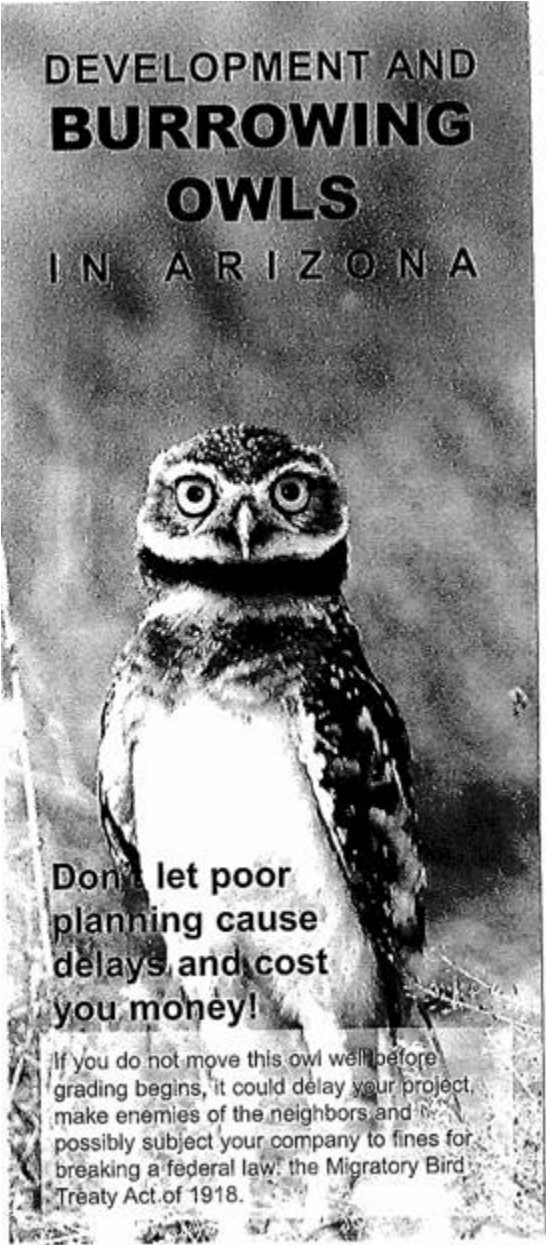
AGFD #M-06-07055757

Special Status Species within 3 Miles of T04.0S, R03.0E SEC 21, 22, 27, 28

NAME	COMMON NAME	ESA	USFS	BLM	STATE
<i>Athene cunicularia hypugaea</i>	Western Burrowing Owl	SC		S	

No Critical Habitats in project area. AGFD # M06-07055757. Proposed Improvements to SR 347 & UPPR Grade Separation Feasibility Report. ADOT TRACS No.: H7007 01D

Arizona Game and Fish Department, Heritage Data Management System, July 13, 2006.
Project Evaluation Program.





Telephone Record

Project:	Project No:
Date:	Subject:
Call to:	Phone No:
Call from:	Phone No:

Discussion, Agreement and/or Action:

Nancy said that I would not receive anything formal from her regarding cultural resources for the SR 347 grade separation project. The formal consultation would be done government agency to government agency. However, she said that there were no sites or traditional cultural properties in the vicinity of the project area. The area has been the heart of the city of Maricopa for a long time and received a lot of surface impacts, so while the area was heavily occupied 2,000 to 3,000 years ago, these surface sites have been eliminated. She said that there is always the potential for subsurface artifacts. She said there were no issues with this project, and that the Ak-Chin Indian Community has wanted this project for a very long time.

MINUTE MEMORANDUM
FEDERAL HIGHWAY ADMINISTRATION
ARIZONA DIVISION
October 26, 2006
E-File: 347-A(AST)=2006-10-26

SUBJ: Project STP-347-A(AST)dum
SR-347 @ UP RR in MARICOPA

TO: Files (File STP-347-A(AST)dum)

FROM: Kenneth H. Davis, Senior Engineering Manager - Operations

Last evening (October 25, 2006), I attended a public meeting conducted by the City of Maricopa, with the assistance of HDR and other consulting firms. The purpose of the meeting was to (1) provide information generated to date on an effort to identify an acceptable concept for constructing a grade separation of SR-347 either over or under the UP RR in Maricopa; and (2) to obtain public input on the options displayed, as well as to identify any other options suggested by the public, plus any concerns or other comments the public has regarding a railroad grade separation at this location. Approximately 25 people (not counting ADOT, FHWA, and consultant staff) attended, including the Mayor of Maricopa, several other members of the City Council, and members of the City’s staff. The meeting was held in the Multi-Purpose Room at the Maricopa High School

The meeting used the combination format – starting with the public viewing a number of display boards, followed by a brief presentation by HDR Staff, followed by a question and answer session, and concluded with individual discussions between ADOT/Consultant staff and the public at the display boards and/or around work tables with aerial photographs showing five options under consideration at this time. I found the displays, the presentation, and the materials at the work table to be excellent. My only constructive suggestions concern (1) the small size of some text on some of the slides – a few were somewhat difficult to read in the back of the room; and (2) the need to repeat questions raised by members of the audience – it was difficult for those toward the back of the audience to hear questions posed from those near the front of the audience. This latter difficulty was recognized and the questions were repeated in most (but not all) cases. To be fair, both of these concerns were minor. Overall, I was very pleased with the conduct of the meeting and felt it was very effective.

It was immediately apparent, as identified in the presentation, that (1) there is an acute and growing problem with the existing grade crossing where SR-347 crosses the UP RR; and (2) there are no obvious low-impact and/or low cost alternatives for providing the needed grade separation. The continuing rapid development of Maricopa, the rapid increase in traffic on SR-347, and the continuing growth in train traffic along the UP RR (including present efforts to add a second mainline track and long-range plans to provide for a third mainline track) has created a significant problem and that problem will only get worse if an acceptable solution is not found. It was also apparent that each of the conceptual options presented had substantial

impacts to existing business and residential development in the immediate vicinity of the present grade crossing, including most of the businesses in the older business district of Maricopa. Among these impacts, right-of-way needs, access to remaining businesses and residences, and visual impacts appeared to be substantial for all five options. Finally, it was apparent that all of the five options presented would be very expensive. Finding funds to accomplish the needed improvement is and will be a significant challenge.

The possibility of using Federal-aid funds was mentioned, along with the suggestion that using Federal-aid funds would cause the project to take substantially longer to develop and complete. I felt this additional time requirement associated with Federal-aid funds may have been overstated or over-emphasized. While I concede that the Federal-aid process does add additional requirements and can require additional time, I believe the primary causes of delay for this project will be (1) identifying and quantifying the impacts of each alternative, (2) reaching consensus among the business and residents of Maricopa on an acceptable solution, and (3) finding the funds to complete the project. All three of these hurdles exist with or without Federal-aid funding. Unless there is a clear and secure funding source that does not include Federal funds, I would caution against attempting to save time by avoiding the Federal-aid process. Federal-aid funding may be part of the funding solution and I believe it would not be wise to forego that option at this early date. The best way to shorten the Federal-aid process is to aggressively and thoroughly identify and quantify the all impacts associated with each alternative considered.

The information presented at this public meeting was largely in two dimensions. Except perhaps for the engineers in attendance, the impacts associated with elevation differences were difficult to discern. I believe these elevation impacts (grades, heights of structures, heights of embankments, etc.) will play an enormous role in identifying acceptable engineering solutions and in conveying the impacts associated with various alternatives to the public in a manner in which they can understand, appreciate and compare. Creative graphics or models may prove very helpful in gaining public understanding of these impacts, and ultimately in gaining public support and acceptance of a consensus solution – I urge that consideration be given to these types of tools.

Public questions and comments pertained to traffic projections, other available options, particularly involving other north-south or east-west roadways that might cross the railroad (via grade separation), right-of-way acquisition process, access to businesses, churches and residences, railroad relocation options/feasibility, traffic safety, congestion mitigation, and other improvements along SR-347. No one expressed opposition to the need for a grade separation of SR-347 at the UP RR.

Thanks to all who prepared for and conducted this public meeting. From my perspective, it was an excellent effort.

Appendix C

Public Comments Received



City of Maricopa Transportation Improvements

PLEASE GIVE US YOUR COMMENTS

The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and return it tonight or mail it in.

1. On a scale of 1 – 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best					Worst	
Option 1:	1	2	3	4	5		Why? _____
Option 2:	1	2	3	4	5		Why? <u>poor access to existing businesses</u>
Option 3:	1	2	3	4	5		Why? _____
Option 4:	1	2	3	4	5		Why? <u>same</u>
Option 5:	1	2	3	4	5		Why? <u>same</u>

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?

its the only way to Phoenix
Construction = major headaches

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

relocation, no parking, loss of revenue
and business!



City of Maricopa Transportation
Improvements

PLEASE GIVE US YOUR COMMENTS

The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and return it tonight or mail it in.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best				Worst	
Option 1:	1	2	3	4	5	Why? Remote access to Henry at
Option 2:	1	2	3	4	5	Why? Same as 5
Option 3:	1	2	3	4	5	Why?
Option 4:	1	2	3	4	5	Why? Same as 1 + property impact
Option 5:	1	2	3	4	5	Why? Splits 2 major roads access

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?



City of Maricopa Transportation
Improvements

PLEASE GIVE US YOUR COMMENTS

The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and return it tonight or mail it in.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best				Worst	
Option 1:	1	2	3	4	5	Why? Not much change
Option 2:	1	2	3	4	5	Why? More option for other ways to get out of town...
Option 3:	1	2	3	4	5	Why? The next step
Option 4:	1	2	3	4	5	Why? Not much Change
Option 5:	1	2	3	4	5	Why?

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?

Making it wide enough or redirecting traffic

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?

only one way out of town

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

Traffic redirected? Less accident



City of Maricopa Transportation
Improvements

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The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and return it tonight or mail it in.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best				Worst	
Option 1:	1	2	3	4	5	Why? <u>see cont. to Opt. 4</u>
Option 2:	1	2	3	4	5	Why? <u>Bridge building will have small effect on current traffic – simple layout – less current domain req'd</u>
Option 3:	1	2	3	4	5	Why? <u>Only 2 bridges – ^{bridge} not built over existing 347 – simple layout</u>
Option 4:	1	2	3	4	5	Why? <u>Bridges built over existing road = drastic effect on traffic during building</u>
Option 5:	1	2	3	4	5	Why? _____

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?
Traffic detours, construction zones, safety issues associated with construction, businesses / homes would need to be removed for improvements

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?
Same as above w/ possible exception of business/home removal

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?
traffic detours, removal for new roads



City of Maricopa Transportation
Improvements

PLEASE GIVE US YOUR COMMENTS

The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and mail it to the address on the back, or email it to kwonders@cityofmaricopa.net.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best				Worst	
Option 1:	1	2	3	4	5	Why? <u>Honeycutt Rd is currently becoming congested – no need to add ^{more} traffic shouldn't be routed around the neighborhood</u>
Option 2:	1	2	3	4	5	Why? <u>Honeycutt Rd is too congested right now as is + will worsen when Tortosa is complete.</u>
Option 3:	1	2	3	4	5	Why? <u>Should move maricopa – Casa Grande Hwy traffic south to alleviate more congestion in already congested area</u>
Option 4:	1	2	3	4	5	Why? <u>On + Off ramps would look tacky; congested area already</u>
Option 5:	1	2	3	4	5	Why? <u>moves extra traffic away from the most congested current area. ++</u>

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?
dust; detours during construction

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?
possible detours; delays; longer travel time during construction

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

NOV 13



City of Maricopa Transportation
Improvements

PLEASE GIVE US YOUR COMMENTS

The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and return it tonight or mail it in.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best				Worst	
Option 1:	1	2	3	4	5	Why? 1 Crossing bridge, ^{Bad} into neighborhood, ^{Bad} Loops
Option 2:	1	2	3	4	5	Why? 3 crossing bridges, ^{Bad} Maricopa - Casa Grande Does Not Join 347
Option 3:	1	2	3	4	5	Why? 2 crossings, ^{Good} Maricopa - Casa Grande does join 347, ^{Bad} Needs 3rd Southern Crossing
Option 4:	1	2	3	4	5	Why? 1 Crossing, No Stops ^{Bad} Needs Southern Crossing
Option 5:	1	2	3	4	5	Why? ^{Good} 347 and Maricopa exchange with bridge would allow no stop light 2 Bridges, unclear

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?

Traffic Congestion, elevated noise levels from bridge traffic, Avoid isolating neighborhoods
solution: Buffer Zone Parks @ Trees, Add trees to washes,

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?

Traffic Congestion if less than 2 lanes N + S.

solution: Buy out business early to enable use of 2 lanes N+S

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

Only those nearest crossings will be affected. Those should be compensated early so the project can move on. Relocation should be an option for viable business, not just to ...



City of Maricopa Transportation
Improvements

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The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and return it tonight or mail it in.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best				Worst	
Option 1:	1	2	3	4	5	Why? Only 1 bridge - limited access to neighborhoods
Option 2:	1	2	3	4	5	Why? Maricopa - Casa Grande Highway does not intersect 347 - potential for too many tracks on Honeycutt
Option 3:	1	2	3	4	5	Why? 2 crossings and 347 does intersect Maricopa Casa Grande
Option 4:	1	2	3	4	5	Why? No clear Southern crossing
Option 5:	1	2	3	4	5	Why? No restriction with 2 bridges - no loops as in #4

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?

Restricted lanes during construction. Increased noise for those living near the sites, especially troublesome if most work done at night.

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?

Traffic delays

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

limited access to business is inevitable for those close to sites. Serious consideration should be given and if appropriate - properties bought and owners fairly compensated. This will be the emotional component for those wanting to maintain a small town atmosphere.



City of Maricopa Transportation
Improvements

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1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best					Worst	
Option 1:	1	2	3	4	5		Why? <u>Could be workable</u>
Option 2:	1	2	3	4	5		Why? <u>It is a very expensive solution</u>
Option 3:	1	2	3	4	5		Why? <u>It is a very expensive solution</u>
Option 4:	1	2	3	4	5		Why? <u>It is a very expensive solution</u>
Option 5:	1	2	3	4	5		Why? <u>It is a very expensive solution</u>

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?

Increased traffic - noise and pollution from cars and trucks - could possibly see gas stations and shopping centers that go with that. This is going to be a big challenge.

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?

Increased traffic - noise and pollution from cars and trucks - could possibly see gas stations and shopping centers that go with that. This is going to be a big challenge.

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

Increased traffic - noise and pollution from cars and trucks - could possibly see gas stations and shopping centers that go with that. This is going to be a big challenge.



City of Maricopa Transportation
Improvements

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The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and mail it to the address on the back, or email it to kwonders@cityofmaricopa.net.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best					Worst	
Option 1:	1	2	3	4	5		Why? <u>Cost + waste of land</u>
Option 2:	1	2	3	4	5		Why? <u>Noise, high cost, too many bridges</u>
Option 3:	1	2	3	4	5		Why? <u>Simple, not too many signals, preserves land for commercial</u>
Option 4:	1	2	3	4	5		Why? <u>Simple, flows well, not too many bridges</u>
Option 5:	1	2	3	4	5		Why? <u>Noise, pollution, expense, would lower values</u>

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?

Temporary noise, etc

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?

Temporary detours

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

none if correct option is chosen

Note: I'm in favour of Road passing under R.R.



City of Maricopa Transportation
Improvements

PLEASE GIVE US YOUR COMMENTS

The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and mail it to the address on the back, or email it to kwonders@cityofmaricopa.net.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best					Worst	
Option 1:	1	2	(3)	4	5		Why? _____
Option 2:	1	2	3	(4)	5		Why? 3 BRIDGES EXPENSIVE!
Option 3:	(1)	2	3	4	5		Why? LEAST COMPLEX LESS CONSTRUCTION LEAST EXPENSIVE
Option 4:	1	(2)	3	4	5		Why? TOO MUCH CONSTRUCTION, RAMP, 2 BRIDGES? PUT BOTH BRIDGES UNDER PASS
Option 5:	1	2	3	4	(5)		Why? _____

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?
TRAFFIC MOVING FREELY DURING CONSTRUCTION, ACCESS TO
BUS MESSAGES

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?
TRAFFIC MOVING FREELY DURING CONSTRUCTION

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

TED YOCUM
44220 W. BUCKHORN TRAIL
MARICOPA, AZ 85239



City of Maricopa Transportation
Improvements

PLEASE GIVE US YOUR COMMENTS

The City of Maricopa, in conjunction with the Arizona Department of Transportation, is considering options for a grade separation – either an overpass or underpass – at John Wayne Parkway (State Route 347) and the Union Pacific Railroad (UPRR) tracks. Public input about this project is highly valued by City staff. It is important to hear from you so we can make the best decisions for our community. Please fill out this form and mail it to the address on the back, or email it to kwonders@cityofmaricopa.net.

1. On a scale of 1 - 5 (with 1 being the best solution and 5 the worst) how would you rate these alternatives for SR347/UPRR grade crossing improvements?

	Best					Worst	
Option 1:	1	(2)	3	4	5		Why? Cost
Option 2:	1	2	(3)	4	5		Why? Cost
Option 3:	(1)	2	3	4	5		Why? Seems simple and cost effective. Time to build is less.
Option 4:	1	2	3	(4)	5		Why? Cost
Option 5:	1	2	3	4	(5)		Why? Cost is high. Continuous Traffic in my area.

2. What are the biggest challenges that Maricopa RESIDENTS will face with the redesign and construction of the SR347/UPRR grade crossing?
Cost, inconvenience of construction

3. What are the biggest challenges that Maricopa COMMUTERS will face with the redesign and construction of the SR347/UPRR grade crossing?

4. What are the biggest challenges that Maricopa BUSINESSES will face with the redesign and construction of the SR347/UPRR grade crossing?

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